JBFA Journal of Business Finance & Accounting

Journal of Business Finance & Accounting, 43(9) & (10), 1197–1243, October/November 2016, 0306-686X
doi: 10.1111/jbfa.12213

Earnings Warnings and CEO Welfare

PING WANG, MASAKO DARROUGH AND LINNA SHI*

Abstract: Some CEOs decide voluntarily to issue a warning when they expect a negative earnings surprise. Prior research suggests that warnings contain incremental information beyond actual earnings; warning firms tend to experience permanent earnings decreases. This paper investigates whether compensation committees take warnings into account in setting CEO compensation. We find that warnings are significantly negatively (positively) associated with CEO bonus (option grants), suggesting that compensation committees adjust CEO compensation towards a more high-powered structure after warnings. However, the sensitivity of bonus or option grants to earnings and stock returns is not affected except for bonus sensitivity to stock returns. We also find weak evidence of an increase in forced CEO turnover after warnings, accompanied by a significant increase in its sensitivity to stock returns. This benefits CEOs with higher ability but imposes more risk on other CEOs. These findings provide a partial explanation of why not every CEO facing a negative surprise decides to issue a warning. Our results are robust to various specifications. In particular, the impact of warnings on compensation appears invariant to the timing or the number of warnings. Overall, these findings suggest that the signal from warnings is used in determining CEO compensation and retention.

Keywords: management guidance, warnings, CEO compensation, CEO turnover

1. INTRODUCTION

When faced with an impending negative earnings surprise, CEOs have to decide whether or not to voluntarily issue earnings warnings. A warning (defined as negative earnings guidance) might be issued when a firm expects that its actual earnings will fall short of existing market expectations. Such a warning is typically issued near or after the end of a fiscal quarter, but before quarterly or annual earnings are announced.[1] The extant literature on US firms documents a number of reactions to the issuance of an earnings warning, including: an adjustment by the market of its expectations, typically through a reduction in share prices (Kasznik and Lev, 1995; Tucker, 2007; and Das et al., 2012); a decrease in litigation costs (Skinner, 1997); less information asymmetry among investors (Coller and Yohn, 1997); increased analyst following

*The first author is from Lubin School of Business, Pace University, New York, USA. The second author is from Zicklin School of Business, Baruch College-CUNY, New York, USA. The third author is from Lindner College of Business, University of Cincinnati. (Paper received June 2014, revised revision accepted June 2016).

Address for correspondence: Ping Wang, Lubin School of Business, Pace University, New York, NY.
email: pwang@pace.edu

1 Warnings are usually issued in the context of the results for a particular quarter. Warnings issued in the fourth quarter, however, might pertain to results for the fourth quarter or to that of the whole year.

© 2016 John Wiley & Sons Ltd

(Lang and Lundholm, 1996); and increased chances of meeting or beating analysts' forecasts (Brown et al., 2005; Cotter et al., 2006; and Keskek et al., 2013).[2] Given that these firms tend to be performing poorly (or at least below market expectations), the issuance of warnings appears to be an integral part of the timely disclosure of bad news.

Timely disclosure of news is important to investors, especially when firms expect to fall short of market expectations. Issuing warnings ahead of actual earnings announcements brings some benefits to firms in this position, such as reducing the potential class period in the case of litigation, while incremental costs appear to be small since negative market reactions are likely to occur anyway, at the time either of warnings or of actual earnings announcements. One would expect that most firms facing a negative earnings surprise would issue warnings so that investors would not be caught off guard. Thus, it is surprising to find that a relatively small number of companies issue these warnings when they face negative earnings surprises; prior literature reports that less than 25% of firms preempt negative earnings surprises by issuing warnings (Skinner, 1994; and Kasznik and Lev, 1995). This finding suggests that the decision on whether or not to issue warnings is not as straightforward as one might think. Since this decision is probably made by CEOs (and CFOs) rather than firms as a whole (Bamber et al., 2010), an agency problem might exist.[3] In this paper, we examine the consequences of warnings that might directly accrue to CEOs who have to decide whether or not to issue these warnings. Our overall research question is whether and how boards of directors make use of voluntary disclosures in the form of warnings in determining CEOs' compensation and retention/turnover.

Research that directly examines the relationship between management earnings guidance and CEO compensation is limited.[4] De Franco et al. (2013) examine whether firms that issue management guidance (favorable, neutral and negative guidance combined) exhibit a higher sensitivity of CEO compensation to firm performance. They argue that management guidance improves transparency, which enhances the board's ability to assess CEO activities, and find that firms with management guidance indeed have higher pay-performance sensitivity (PPS) to both accounting and stock returns. Research on the association between management guidance and CEO turnover is also limited. The study by Lee et al. (2012) is an exception. They find evidence that the probability of CEO turnover decreases with management guidance accuracy, indicating that management guidance acts as a signal regarding the CEOs' ability to handle business uncertainty.

While the above articles demonstrate that management guidance is associated with PPS and CEO turnover, they do not explicitly examine how the issuance of warnings affects CEOs' compensation and turnover. Despite various benefits that firms as a

2 Houston et al. (2010) and Chen et al. (2011) study firms that stopped issuing earnings guidance and find consistent results: forecast accuracy is reduced and forecast dispersion is increased after firms cease to provide management earnings guidance. For a comprehensive review of the benefits and costs of providing earnings guidance, see http://www.capmktsreg.org/pdfs/09-Sept-15_CCMR-Miller_Study_on_Earnings_Guidance.pdf.

3 Some may argue that it is the board of directors that makes decisions on management guidance. If that is the case, CEOs are unlikely to be penalized, which may lead to no results in our study.

4 Focusing on options that have fixed award schedules, Aboody and Kasznik (2000) show that CEOs are more likely to issue negative earnings guidance prior to option grant dates. By timing the negative earnings guidance, CEOs try to lower the strike price on the grant date and increase the value of their stock option compensation. Nagar et al. (2003) argue that CEOs with greater levels of equity holdings have incentives to issue earnings guidance in order to avoid equity mispricing which may adversely affect their wealth.

© 2016 John Wiley & Sons Ltd

whole receive from issuing warnings, only a relatively small percentage of firms issue such warnings. This phenomenon cannot be explained unless we consider the welfare consequence of those who must decide whether warnings should be issued. This study tries to fill the void in the literature by examining how warnings affect both CEOs' bonus and equity-based compensation and CEO turnover.

Although management guidance encompasses positive, neutral and negative guidance, we focus on warnings in this study because: (1) prior literature has shown that positive earnings guidance is less value-relevant and less credible compared to negative earnings guidance; (2) warnings are more value-relevant than earnings guidance that is simply neutral and confirming; (3) studies have shown that firms that issue warnings tend to experience poor performance in the following years (discussed below), which is more likely to affect CEO compensation. Item (3) is particularly important because it suggests that warnings possibly provide information to compensation committees about future firm performance that is incremental to the information contained in actual earnings.

Using 1,320 firm-year observations of warnings and 8,969 firm-years of non-warnings from 1996–2010, we examine the following issues: (1) how warnings affect bonus and stock-based compensation of CEOs; (2) how warnings affect PPS; (3) how warnings affect CEOs' total compensation; and (4) how warnings affect CEO turnover. Both warning and non-warning CEOs may expect negative earnings surprises, but the former decide to warn, and the latter decide not to warn.

The first issue we study is whether warnings directly affect the level of CEO compensation, as reflected both in bonus and in stock options. Warnings can provide incremental information over and above actual earnings. Results from Kasznik and Lev (1995), Tucker (2007) and Xu (2008) suggest that warnings tend to be issued for permanent earnings decreases, while transitory ones go without warnings. Specifically, Kasznik and Lev (1995) find that analysts adjust their forecasts of the *next year's* earnings downward for firms issuing warnings; Xu (2008) documents that firms that issue warnings experience lower future earnings; and Tucker (2007) shows that the performance of a firm in the following year of a warning is significantly lower than that of firms that did not issue a warning. Thus, evidence suggests that the very act of issuing warnings could provide incremental information about firm prospects over and above the actual earnings shortly to be released. If warnings provide information about CEOs' performance that is incremental to that gleaned from actual accounting and stock-based returns, then compensation committees might use this information to adjust CEO compensation. On the other hand, it is possible that compensation committees do not pay attention to warnings since actual earnings would be available at the time they determine CEO compensation. Any information in the warnings could be superseded by the actual earnings, which are more reliable. It is also possible that in trying to encourage CEOs to be more forthcoming about impending bad news, compensation committees shield CEOs from bad news; i.e., they do not "shoot the messenger". If so, a CEO's compensation would not be affected by warnings. Taken together, it is an empirical question as to whether and in what way warnings affect CEO compensation.

While performance-based CEO compensation has several components, we focus on bonus and stock options in this study. The bonus of CEOs is typically awarded, *ex post*, based on *past* performance, while option grants are awarded, *ex ante*, to incentivize CEOs to take *future* value-maximizing actions. The poor performance signaled by

© 2016 John Wiley & Sons Ltd

warnings may indicate that the interests of managers are not well-aligned with those of shareholders. If warning firms' equity incentive levels are deemed insufficient (excessive) to optimally incentivize CEOs, we would expect compensation committees to grant additional (less) stock-based compensation to provide more (fewer) incentives to CEOs (Core et al., 2003a). The opportunistic timing of warnings by CEOs to maximize the value of their option grants may be tolerated by boards of directors as an implicit form of compensation (Aboody and Kasznik, 2000). In addition, granting more options can make up for any reductions in a CEO's bonus that might result, as well as encourage CEOs to voluntarily issue negative earnings guidance.

After controlling for CEOs' self-selection in the issuance of warnings, we find that warnings are significantly negatively associated with CEO bonuses, but positively associated with option grants. This association indicates that compensation committees view earnings warnings as an important component of performance measures for determining compensation, consistent with the conjecture that the information contained in warnings is incremental to actual earnings that are shortly to be announced. By issuing warnings, CEOs are conveying incremental information about the future prospects of the firm as well as their managerial type.

The second issue we examine is the effect of warnings on bonus-to-performance and option-to-performance sensitivity. Lambert and Larcker (1987) argue that stock returns should become more useful in evaluating CEO performance when the consequences of the agent's current-period actions are realized in the future but are not fully reflected in current-period accounting numbers. We would then expect to see an increase in compensation sensitivity to stock returns for warning CEOs. Consistent with this expectation, De Franco et al. (2013) find that issuance of management guidance increases bonus PPS, supporting their argument that voluntary disclosure of management guidance decreases the noise in performance measures. Based on our sample, we find a similar result; the sensitivity of bonus to stock returns is increased. We also find that the magnitude of the coefficient on the warnings variable is much larger than that on the (combined) guidance variable in De Franco et al. (2013), indicating that compensation committees consider warnings as a stand-alone performance measure.

Third, we investigate the effect of warnings on total compensation. Since bonus is reduced, but options are increased after warnings are issued, we need to examine the net effect of warnings on total compensation. We find that total compensation is not affected by warnings, suggesting that compensation committees adjust CEO compensation towards a more option-based structure to ensure that CEOs' interests are better aligned with those of shareholders. Issuance of warnings appears to be interpreted as a signal that re-alignment of incentive structures is warranted.

Lastly, we explore the effect of warnings on CEO turnover to see if warnings result in any benefit or cost to CEOs. On the one hand, if management guidance accuracy (about future prospects) is an indicator of ability (Trueman, 1986; Baik et al., 2011; and Lee et al., 2012), then we would expect warnings to reduce CEO turnover by increasing perceived management ability and reputation. On the other hand, if warnings about impending negative earnings surprises do not reflect managerial ability, and warnings signal a disappointing future performance, then CEO turnover rate may increase. Our empirical results, however, paint a nuanced picture. First, we find weak evidence that warnings directly increase the rate of forced turnover. Second, we find that warnings increase the sensitivity of turnover to stock returns, which may

© 2016 John Wiley & Sons Ltd

benefit CEOs who were able to generate positive stock returns during the year but penalize CEOs who were unable to do so. In other words, when returns are positive, the forced turnover rate is reduced more for warning firms than for non-warning firms; when returns are negative, the turnover rate is increased more for warning firms than for non-warning firms.

This paper contributes to the accounting literature by documenting the welfare impact of the issuance of warnings on CEOs who make the issuing decisions. We report evidence that suggests that compensation committees view the information conveyed in warnings as an important performance measure. While prior literature has shown that management guidance, in general, is associated with CEO compensation and turnover, we find a stronger and more direct impact of warnings on CEOs' welfare. In addition to PPS, warnings directly affect bonus and option grants, after controlling for self-selection. While CEOs are not penalized in terms of total compensation, their compensation packages are restructured and become more equity-based when they issue warnings. In addition, we show that CEO turnover is affected by the issuance of warnings. Our findings may explain why a relatively small proportion of CEOs warn when they face a negative earnings surprise, even though their firms as a whole benefit from warnings.

The remainder of the paper is organized as follows. Section 2 develops the hypotheses about bonus compensation and its sensitivity to performance measures, option compensation and its sensitivity to performance measures, and CEO turnover. Sample selection and descriptive statistics are discussed in section 3. Research designs and empirical results are presented in section 4. We start with a baseline model, followed by a model of self-selection to account for the voluntary choice to issue warnings. Section 5 details the robustness checks and further analysis. Section 6 concludes the paper.

2. HYPOTHESIS DEVELOPMENT

(i) CEO Compensation and Pay–Performance Sensitivity

The standard agency model (Holmström, 1979) prescribes that an agent's compensation should be a function of the firm's performance, and that optimal contracts should be based on the variables that are useful in assessing the agent's actions and type, including variables that may not be under direct control of the agent (e.g., macroeconomic factors and performance of competitors). Evidence from companies' proxy statements supports the prescription of the agency model. For example, Mocon's (2007) proxy statement states:

> "...The goal may be financial or non-financial in nature, and the Compensation Committee has the sole discretion in determining each year whether or not the goal has been achieved. In setting the goal each year, the Compensation Committee will choose one or more objectives that are important to the long-term success of our company, but that may or may not have a significant short-term financial impact".

Our research question is: do compensation committees incorporate warnings when exercising their "discretion"? When compensation committees award bonus and option compensation to CEOs, they have at their disposal data on realized earnings; they do not have to rely on managerial forecasts to learn what earnings are.

© 2016 John Wiley & Sons Ltd

Therefore, the relevant question is what incremental information warnings provide to compensation committees that is not included in actual earnings and other financial results. If warnings are to provide any information that is relevant for compensation determination, they must contain incremental information about CEOs, such as their effort or ability, or about future firm prospects.

Kasznik and Lev (1995) argue that warnings are issued for long-term earnings deterioration, not for transitory negative earnings surprises, by showing that analysts adjust their forecasts of the next year's earnings more negatively for warning firms than for firms that do not issue warnings. Consistent with this argument, Xu (2008) provides evidence that warning firms experience more severe earnings declines a year after warnings are issued than non-warning firms. As accounting earnings reflect past performance, the analysts' adjustments are more likely to reflect the incremental information revealed by warnings. This is also supported by anecdotal evidence that warnings raise analysts' concerns about the firms' long-term viability. For example, Reuters News reports on October 25, 2002:[5]

> "Deutsche Bank analysts Mark Cusak and Peter Reilly on Friday slashed their share price target for industrial engineer ABB to 0.1 Swiss francs from three francs following an earnings warning and nine-month loss.... 'ABB may be in loss for both this and next year', they wrote in a note."

If warnings signal the persistence of negative earnings surprises not yet reflected in actual earnings, then compensation committees are likely to consider the implication of warnings when setting CEO compensation. Prior studies, therefore, suggest that CEOs decide to issue warnings in order to convey their private information about the future prospect of the firms that are *not* contained in the actual earnings.

Two important variable components of CEO compensation are bonus and stock option grants.[6] It is possible that a compensation committee adjusts CEO compensation based on whether or not the CEO has issued a warning. The effect of warnings on CEO bonuses depends on how the warning signals are interpreted. A bonus is typically reduced if a CEO's actual performance is poor, but not necessarily because the CEO has issued a warning. However, if warnings contain incremental information about a poor outlook for the firm's future, the CEO might be penalized. On the other hand, if warnings contain no information incremental to actual earnings, then a CEO's bonus is unlikely to be affected by warnings *per se*. Furthermore, CEOs who voluntarily issue warnings may be viewed as more capable and forthright. In such a case, CEOs may not be penalized even though the news is bad.[7] Altogether, it is an empirical question as to whether and in what direction warnings affect CEO bonuses. Therefore, our first hypothesis is stated in the null form:

5 Another example is *The Globe and Mail*, which reported on 23 March 2011 "An earnings warning from Canadian Pacific Railway Ltd. has triggered an avalanche of cautionary notes from analysts, who see *a series of challenges ahead* for the freight carrier".

6 Bryan et al. (2000) document that restricted stock, due to its linear pay-off function, is relatively inefficient in inducing risk-averse CEOs to accept risky but value-increasing investment projects. Additionally, restricted stock is not commonly used in compensation contracts (Carter et al., 2007). Therefore, in this paper, we follow Cheng and Farber (2008) and focus on option compensation. In untabulated results, we also include restricted stock; the conclusions are unchanged. We acknowledge that restricted stock became popular in the latter part of our sample period.

7 As suggested by Murphy (1999), compensation committees have some discretion over the determination of a portion of CEO bonuses even when a company has a bonus plan.

© 2016 John Wiley & Sons Ltd

H1: *Ceteris paribus*, the size of a CEO's bonus is not associated with whether or not an earnings warning has been issued.

Next, we examine whether the sensitivity of a CEO's bonus to the firm's performance is affected by warnings. Lambert and Larcker (1987) suggest that market measures of firm performance, such as stock returns, become more useful in evaluating an agent's performance when the consequences of the agent's current actions will be realized in the future but are not fully reflected in current-period accounting numbers. Choi et al. (2011) show that current-period returns are more positively associated with future earnings for guidance firms than for non-guidance firms, indicating that warnings provide incremental information that allows stock returns to better reflect future earnings. Thus, we expect that a CEO's bonus would be more sensitive to stock returns when warnings are issued than if no warnings are issued. This argument is also consistent with the findings in De Franco et al. (2013) that PPS is higher for firms that issue guidance, although they did not test warning firms specifically. In fact, they excluded warning firms in their sensitivity test, so it is worthwhile to see if warnings affect PPS as other guidance does.

H2: *Ceteris paribus*, the sensitivity of a CEO's bonus to stock returns is higher for warning CEOs than for non-warning CEOs.

Contrary to cash-based compensation, stock-based compensation is designed to provide direct incentives to increase firm values and share prices by aligning managers' interests with those of shareholders (Jensen and Meckling, 1976; Antle and Smith, 1986; and Core et al., 2003b). Consistent with this argument, Core and Larcker (2002) find that a sample of firms with low levels of equity holdings was able to improve their performance by adopting "target ownership plans" (plans that require a minimum amount of stock ownership), which led to an increase in CEO stock ownership. If warnings signal that the difficulties firms are experiencing might persist into the future, then they might, in turn, suggest that the actions and choices that CEOs have made so far are not well aligned with the welfare of shareholders. In such a case, compensation committees might modify the compensation structure to be more future-oriented and high-powered by granting more stock options after warnings are issued. The preceding discussion leads to the following hypothesis:

H3: *Ceteris paribus*, warning CEOs experience an increase in option grants relative to non-warning CEOs after warnings are issued.

As argued in H2, when warnings are issued, stock prices respond to and impound relevant information; thus the stock returns of warning firms better reflect future earnings than do those of non-warning firms. We therefore expect that stock-based compensation will be more closely tied to the stock returns of the year during which warnings are issued. We state the following hypothesis in the alternative form:

H4: *Ceteris paribus*, the sensitivity of CEO option grants to stock returns is higher for warning CEOs than for non-warning CEOs.

© 2016 John Wiley & Sons Ltd

(ii) Job Retention Hypothesis

Prior studies have documented some benefits of disclosing bad news for firms, such as reducing litigation costs (Skinner, 1997; and Donelson et al., 2012) and deterring entry of competitors (Darrough and Stoughton, 1990). Nevertheless, Darrough (1995) points out that most disclosure studies have not explicitly modeled the incentives of managers themselves. For example, some papers model managers' objectives as a function of stock price, but the managers' compensation is not directly modeled (Trueman, 1997; and Dutta and Trueman, 2002). As a first step toward empirically exploring the *direct* benefits or costs to CEOs of issuing warnings, we investigate whether issuance of warnings affects CEO turnover rate. Based on the previous finding that warnings signal a disappointing future for the firm, it is possible that the board of directors may lose confidence in the incumbent CEO and force him/her out.

Another stream of literature provides a different perspective. Trueman (1986) suggests that management forecasts signal a manager's ability to anticipate and adjust to changes in the economic environment by revising business plans; management forecast accuracy would therefore be incorporated into CEO-retention decisions. Consistent with Trueman (1986), Lee et al. (2012) document that the absolute management forecast error is positively associated with the probability of CEO turnover. However, they only measure the accuracy of the first management forecast, without taking account that CEOs can update prior forecasts by issuing warnings. If issued warnings improve management forecast accuracy, they could reduce the probability of CEO turnover. In addition, Mercer (2005) finds that CEOs who disclose bad news in a timely fashion gain increased credibility among investors; this phenomenon might also have a favorable effect on CEO turnover. Thus the issuance of warnings could engender both benefits and costs to the CEOs. Therefore, our hypothesis is stated in null form as:

H5: *Ceteris paribus,* the probability of CEO turnover is not affected by the issuance of warnings.

3. SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

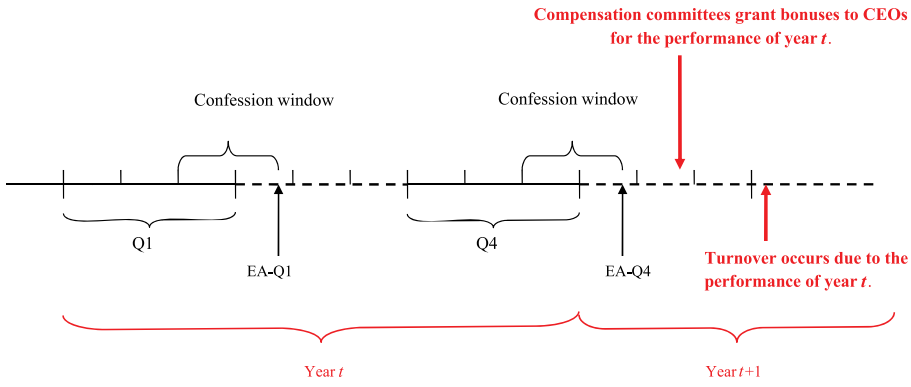
Our sample is based on the intersection of the ExecuComp, First Call, I/B/E/S, and Compustat databases from 1996 to 2010. We start with the year 1996 because the passage of the Private Securities Litigation Reform Act of 1995 changed the legal environment for firms disclosing forward-looking information. We collect warnings from the First Call Company Issued Guidance database.[8] Consistent with the literature, the sample period ends with 2010 because the First Call Company Issued Guidance database changed some variable definitions after 2010.[9] We define warnings as management guidance that falls short of the existing market expectations (Kasznik

8 Our warnings are "negative" management guidance, designated as CIG Description Code="D" by First Call.

9 Tang et al. (2015) surveyed studies on management guidance and found that all papers published in the last 5 years use observations up to 2010. In addition, Chuk et al. (2013) note that the coverage in the First Call Management Guidance database is spotty before 1998, which is consistent with the sample distribution in our paper. To test the robustness of our findings, we eliminate the 2 years prior to 1998, and the results stay qualitatively the same.

© 2016 John Wiley & Sons Ltd

Figure 1
Timeline of Warnings, Bonus Grants and Turnover



and Lev, 1995; Atiase et al., 2006; Tucker, 2007; and Tse and Tucker, 2010). More specifically, warnings are issued during the "confession window" (defined as the period between the beginning of the third month of each fiscal quarter and one day before the earnings announcement date – see Figure 1). Thus, there are four confession windows in each year. We measure CEO compensation and turnover in the period after warnings are issued, as indicated in Figure 1.

The control firms (non-warning firms) are chosen in a manner similar to Tucker (2007). The non-warning firm-years must satisfy the following two requirements: (1) the firm does not issue a warning during any quarter of its fiscal year; and (2) within that year, there is at least one fiscal quarter during which the actual earnings are lower than the analyst consensus forecast before the third fiscal month of the quarter (i.e., the confession window).

Table 1, Panel A, details the sample selection process. This process yields a total of 10,289 firm-year observations with all necessary data from Compustat, First Call, I/B/E/S and CRSP. Among all observations, 1,320 are warning firm-year observations and 8,969 are non-warning firm-year observations. All tests related to warning effects are based on this sample. We winsorize all continuous variables in the sample at the 1% and 99% levels.

Table 1, Panel B, reports that the firm-year distribution is approximately even throughout the sample period up to 2006. However, after 2007, the number of warning firms drops sharply. With the onset of the financial crisis, it appears that firms stopped providing warnings. This might be because the serious financial environment was evident to the market. Alternatively, uncertainty about the future was so great that it was difficult to provide any meaningful management guidance. Overall, warning firms account for 13% of firms in the total sample. The percentage of firms that provide warnings is significantly lower after 2006. Panel C of Table 1 tabulates the top 20 industries, classified according to two-digit SIC code, with the largest number of warnings. It shows that although almost all industries issue warnings, the most warnings are issued in the industrial machinery & equipment, chemical and allied products, electronic equipment, business services, and instruments industries. The distribution of warning and non-warning firms is approximately the same across industries.

© 2016 John Wiley & Sons Ltd

Table 1

Sample Distribution and Descriptive Statistics for Testing the Warning Effect

Panel A: Sample Selection

Sample Selection Criteria:	*Number of firm-year observations*
Available firm-year observations with necessary ExecuComp data over the period 1996–2010	27,207
Less: Firm years with missing COMPUSTAT, CRISP, First Call, IBES, and 13F Institutional Holdings data required for testing	(11,198)
Less: firms years in which both warnings and tip-offs are issued	(172)
Less: firms years in which there are no negative earnings-surprise quarters	(5,548)
Final sample	10,289

Panel B: Number of Observations by Year

Year	*Warning Firms*	*Non-warning Control Firms*	*Total*	*Percentage of Warning firms*
1996	57	537	594	10%
1997	68	631	699	10%
1998	119	585	704	17%
1999	121	553	674	18%
2000	131	504	635	21%
2001	176	521	697	25%
2002	136	413	549	25%
2003	144	581	725	20%
2004	115	584	699	16%
2005	102	618	720	14%
2006	106	655	761	14%
2007	29	453	482	6%
2008	7	793	800	1%
2009	8	760	768	1%
2010	1	781	782	0%
Total	1,320	8,969	10,289	13%

(*Continued*)

© 2016 John Wiley & Sons Ltd

© 2016 John Wiley & Sons Ltd

Table 1
Continued

Panel C: Top 20 Industries with the Largest Number of Warnings

	Warning Firm Years		*Non-warning Firm Years*		*Total*	
Industry	#	%	#	%	#	%
Industrial Machinery & Equipment	97	7.3%	468	5.2%	565	5.5%
Chemical and Allied Products	92	7.0%	583	6.5%	675	6.6%
Electronic & Other Electric Equipment	92	7.0%	535	6.0%	627	6.1%
Business Services	72	5.5%	572	6.4%	644	6.3%
Instruments & Related Products	66	5.0%	424	4.7%	490	4.8%
Primary Metal Industries	54	4.1%	173	1.9%	227	2.2%
Apparel & Accessory Stores	46	3.5%	86	1.0%	132	1.3%
Transportation Equipment	39	3.0%	229	2.6%	268	2.6%
Food & Kindred Products	38	2.9%	250	2.8%	288	2.8%
Paper & Allied Products	38	2.9%	202	2.3%	240	2.3%
Wholesale Trade – Durable Goods	37	2.8%	205	2.3%	242	2.4%
Printing & Publishing	34	2.6%	145	1.6%	179	1.7%
Insurance Carriers	34	2.6%	379	4.2%	413	4.0%
Textile Mill Products	31	2.3%	55	0.6%	86	0.8%
Electric, Gas & Sanitary Services	30	2.3%	746	8.3%	776	7.5%
Apparel & Other Textile Products	28	2.1%	67	0.7%	95	0.9%
Eating & Drinking Places	28	2.1%	153	1.7%	181	1.8%
Depository Institutions	27	2.0%	510	5.7%	537	5.2%
Fabricated Metal Products	25	1.9%	145	1.6%	170	1.7%
Oil & Gas Extraction	24	1.8%	324	3.6%	348	3.4%
Other	388	29.4%	2,718	30.3%	3,106	30.2%
Total	1,320	100%	8,969	100%	10,289	100%

(*Continued*)

Table 1
Continued

Panel D: Warning Distribution by Quarter and by Frequency

Fiscal Quarters	*Number of Warnings Issued*	*Percent*	*Warnings Frequency*	*Number of Firm Years*[*]	*Percent*
1	285	17.8%	1	1,076	81.5%
2	372	23.2%	2	206	15.6%
3	518	32.3%	3	35	2.7%
4	430	26.8%	4	3	0.2%
Total	1,605	100%	Total	1,320	100%

Panel E: Descriptive Statistics

	Full Sample N = 10,289					*Warning Sample N = 1,320*		*Non-warning Control Sample N = 8,969*		*Between sample (Warnings - Non-warnings)*	
	Mean	*Median*	*Q1*	*Q3*	*Std. Dev*	*Mean*	*Median*	*Mean*	*Median*	*T-stat*	*Wilcoxon stat*
Δln(BONUS)	−0.448	0.000	−0.394	0.215	2.856	−1.350	−0.271	−0.315	0.000	−12.376	−15.891
ΔROA	−0.011	−0.002	−0.028	0.012	0.078	−0.028	−0.015	−0.008	−0.001	−8.407	−13.465
RET	0.079	0.051	−0.184	0.282	0.424	−0.070	−0.087	0.101	0.071	−13.779	−15.259
MISSED	0.485	0.000	0.000	1.000	0.500	0.641	1.000	0.462	0.000	12.212	12.125
SURPRISE	−0.010	−0.003	−0.008	−0.001	0.025	−0.011	−0.005	−0.009	−0.002	−2.607	−18.369
ΔSALE	0.067	0.064	−0.020	0.155	0.210	0.056	0.052	0.068	0.067	−1.952	−2.926
LEV	0.234	0.226	0.086	0.350	0.174	0.229	0.232	0.234	0.225	−1.029	−0.167
MB	2.967	2.145	1.467	3.422	2.928	2.889	2.201	2.978	2.138	−1.036	1.206
TENURE	1.855	1.792	1.386	2.398	0.778	1.845	1.792	1.856	1.792	−0.512	−0.430
CEO_CHAIR	0.962	1.000	1.000	1.000	0.191	0.939	1.000	0.966	1.000	−4.811	−4.806

Note:
This table presents sample selection procedures (Panel A), warnings distribution by year (Panel B), by industry (Panel C), by quarter and frequency (Panel D), and descriptive statistics for the variables used to test the warning effect on bonus. All variables are as defined in Appendix C.
[*]The number of firm years is smaller than the number of warnings due to the multiple warnings issued by some firms.

© 2016 John Wiley & Sons Ltd

Panel D of Table 1 details the distribution of warnings by quarter and the frequency of warnings per firm-year. While warnings issued in the first quarter (Q1) are fewer (17.8%), the table shows that warnings are issued in the remaining quarters with similar frequencies. We also find that most firms (81.5%) issue warnings only once in a year. Some firms, however, issue warnings in more than one quarter in a given year: 2 quarters (15.6%), 3 quarters (2.7%), and every quarter (0.2%). Table 1, Panel E, describes the main variables used in the empirical tests on CEO bonuses. Compared to non-warning firms, warnings firms experience greater bonus reductions, lower ROA growth and lower annual cumulative returns. In addition, they are more likely to miss the previous year's earnings and to experience larger negative quarterly earnings surprises and lower sales growth. Overall, the summary statistics indicate that warning firms perform worse than non-warning firms. Table 2 presents the correlation matrix for the main variables.

Table 3 presents the sample distribution, descriptive statistics and correlation matrix for the variables used in testing the hypotheses related to stock option grants. Because of the additional data requirements, the sample size for testing option grants is reduced to 9,947 firm-year observations, but distributions across the sample period are about the same (Table 3, Panel B). Regarding the three measures of option grants we use in this paper, t-statistics indicate that they do not differ significantly between warning firms and non-warning firms except in the value of options granted. As for the control variables, we find that CEOs of warning firms have a greater increase in exercisable options (ΔEXER_OPT) and a greater reduction in cash pay (ΔCASH), relative to CEOs of non-warning firms. Warning firms also experience lower sales growth (ΔSIZE), smaller growth opportunities (ΔMB), a larger reduction in R&D, and a greater reduction in market returns (ΔRET), compared to non-warning firms. Moreover, warning firms are more cash-constrained (ΔCASH_CSTR), earnings-constrained (ΔEARN_CSTR), leveraged (ΔLEV), and riskier (ΔRISK_ID) than non-warning firms. The correlation matrix of these variables is reported in Panel C of Table 3.

To test our turnover hypothesis, we start with the sample used to test the bonus hypothesis. For each firm that experiences a turnover during our sample year, we hand-collect the earliest announcements via Factiva to make sure that the turnover event is coded in the year the earliest announcement was made. This step is important because we want to verify that turnover events occur in the year following warnings in order to establish causality. As in Bushman et al. (2010), we read each announcement and identify whether the turnover is voluntary or forced.[10] Our study focuses only on *forced* turnover, so "turnover" refers hereafter only to such forced turnovers. As a falsification test, we run a regression on voluntary turnovers.

Panel A of Table 4 reports that 7,730 firm-year observations remain after we merge our initial sample with the hand-collected turnover sample. Forced turnover observations account for 3.04% of total observations. Cross-tabulation of the number of warning firms and the number of turnovers demonstrates that 2.67% of

10 The following steps are taken to differentiate forced from voluntary turnovers: First, all turnovers for which press articles report that the CEO is fired, demoted, retires or resigns under questionable circumstances (e.g., policy differences, pressure, lawsuits or suspected earnings management) are classified as forced. Second, we further investigate voluntary turnovers when a CEO retires at age below 60 years and classify them as forced if the article does not report the reason as death, poor health or the acceptance of another position elsewhere. Third, we exclude from the analysis CEO turnovers due to death, interim appointments, mergers or spinoffs.

© 2016 John Wiley & Sons Ltd

Table 2

Pearson Correlation Matrix of Variables used in Testing Warning Effect

	Δln(BONUS)	*ΔROA*	*RET*	*WARN*	*MISSED*	*SURPRISE*	*ΔSALE*	*LEV*	*MB*	*TENURE*
ΔROA	0.145									
	(0.000)									
RET	0.160	0.291								
	(0.000)	(0.000)								
WARN	−0.121	−0.083	−0.135							
	(0.000)	(0.000)	(0.000)							
MISSED	−0.160	−0.507	−0.205	0.120						
	(0.000)	(0.000)	(0.000)	(0.000)						
SURPRISE	0.037	0.141	0.167	−0.026	−0.119					
	(0.000)	(0.000)	(0.000)	(0.009)	(0.000)					
ΔSALE	0.059	0.187	0.109	−0.019	−0.182	0.235				
	(0.000)	(0.000)	(0.000)	(0.051)	(0.000)	(0.000)				
LEV	0.024	0.076	0.004	−0.010	−0.018	−0.083	−0.026			
	(0.014)	(0.000)	(0.652)	(0.304)	(0.069)	(0.000)	(0.009)			
MB	−0.034	−0.017	−0.079	−0.010	−0.031	0.142	0.173	−0.052		
	(0.001)	(0.089)	(0.000)	(0.300)	(0.002)	(0.000)	(0.000)	(0.000)		
TENURE	−0.001	−0.021	0.002	−0.005	0.034	0.013	0.078	−0.052	0.004	
	(0.947)	(0.034)	(0.816)	(0.609)	(0.001)	(0.183)	(0.000)	(0.000)	(0.699)	
CEO_CHAIR	0.011	0.029	0.030	−0.047	−0.021	−0.004	−0.025	−0.006	−0.037	0.016
	(0.248)	(0.003)	(0.002)	(0.000)	(0.036)	(0.688)	(0.012)	(0.560)	(0.000)	(0.097)

Note:

This table presents the Pearson correlations between the variables used to test the warning effect on bonus. All variables are as defined in Appendix C. P-values are based on two-tailed significance levels and are reported in parentheses.

© 2016 John Wiley & Sons Ltd

© 2016 John Wiley & Sons Ltd

Table 3

Sample Distribution and Descriptive Statistics for Testing Stock-based Compensation Hypotheses

Panel A: Number of Observations by Year

Year	*Warning Firms*	*Non-warning Control Firms*	*Total*	*Percentage of Warning firms*
1996	52	495	547	10%
1997	65	621	686	9%
1998	112	560	672	17%
1999	119	535	654	18%
2000	126	488	614	21%
2001	171	507	678	25%
2002	134	400	534	25%
2003	141	568	709	20%
2004	114	577	691	16%
2005	101	608	709	14%
2006	103	643	746	14%
2007	29	439	468	6%
2008	7	774	781	1%
2009	8	737	745	1%
2010	0	713	713	0%
Total	1,282	8,665	9,947	13%

(*Continued*)

Table 3
Continued

Panel B: Descriptive Statistics

	Full Sample N = 9,947					*Warning Sample N = 1,282*		*Non-warning Control Sample N = 8,665*		*Between sample (Warnings − Non-warnings)*	
	Mean	*Median*	*Q1*	*Q3*	*Std. Dev*	*Mean*	*Median*	*Mean*	*Median*	*T-stat*	*Wilcoxon stat*
Δln(OPTION$)	−0.106	0.000	−0.338	0.400	3.207	−0.256	0.000	−0.084	0.000	−1.799	−1.008
Δln(OPTION#)	−0.037	0.000	−0.276	0.382	2.296	−0.132	0.000	−0.023	0.000	−1.583	2.463
Δ(OPTION%)	−0.074	0.000	−0.353	0.380	2.927	−0.055	0.000	−0.077	0.000	0.249	− 0.165
ΔSHARES_OWN	−2.870	0.037	−0.561	0.556	13.556	−3.483	0.033	−2.779	0.037	−1.736	8.740
ΔEXER_OPT	0.494	0.371	−0.104	1.629	3.842	1.047	0.792	0.412	0.323	5.535	−0.366
ΔSIZE	−0.123	0.000	−0.772	0.533	3.179	−0.198	0.000	−0.112	0.000	−0.900	−2.933
ΔMB	0.065	0.064	−0.020	0.154	0.208	0.055	0.052	0.067	0.067	−1.927	−10.973
ΔR&D	−0.235	−0.071	−0.586	0.332	2.137	−0.478	−0.285	−0.199	−0.039	−4.362	1.255
ΔRET	0.000	0.000	0.000	0.000	0.012	0.001	0.000	0.000	0.000	0.655	−8.869
ΔCASH_CSTR	−0.067	−0.063	−0.387	0.268	0.679	−0.209	−0.182	−0.046	−0.046	−8.096	1.464
ΔEARN_CSTR	−0.021	−0.006	−0.075	0.054	0.157	−0.012	−0.004	−0.022	−0.006	2.240	1.835
ΔCASH	0.014	0.000	0.000	0.000	0.266	0.027	0.000	0.013	0.000	1.850	−11.578
ΔLEV	−0.079	−0.009	−0.160	0.070	0.639	−0.188	−0.070	−0.063	−0.005	−6.584	3.274
ΔRISK_ID	0.005	0.000	−0.023	0.023	0.070	0.012	0.000	0.004	0.000	3.798	3.144

(*Continued*)

© 2016 John Wiley & Sons Ltd

© 2016 John Wiley & Sons Ltd

Table 3
Continued

Panel C: Pearson Correlation Matrix of Main Variables

	Δ*ln (OPTION$)*	Δ*ln (OPTION#)*	Δ*(OPTION%)*	Δ*SHARES_OWN*	Δ*EXER_OPT*	Δ*SIZE*	Δ*MB*	Δ*RD*	Δ*RET*	Δ*CASH_CSTR*	Δ*EARN_CSTR*	Δ*CASH*	Δ*LEV*
ΔLn(OPTION#)	0.960												
	(0.000)												
Δ(OPTION%)	0.503	0.495											
	(0.000)	(0.000)											
ΔSHARES_OWN	−0.046	−0.041	0.040										
	(0.000)	(0.000)	(0.000)										
ΔEXER_OPT	0.329	0.360	−0.020	−0.145									
	(0.000)	(0.000)	(0.050)	(0.000)									
ΔSIZE	0.012	−0.011	−0.045	−0.070	−0.052								
	(0.234)	(0.278)	(0.000)	(0.000)	(0.000)								
ΔMB	0.001	−0.006	0.021	0.007	0.017	−0.042							
	(0.931)	(0.554)	(0.035)	(0.459)	(0.084)	(0.000)							
ΔR&D	−0.019	−0.015	0.001	0.050	0.000	−0.053	0.013						
	(0.058)	(0.129)	(0.903)	(0.000)	(0.974)	(0.000)	(0.204)						
ΔRET	−0.002	0.023	0.018	−0.032	0.046	−0.173	0.374	−0.079					
	(0.880)	(0.023)	(0.072)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)					
ΔCASH_CSTR	−0.013	−0.018	0.012	−0.014	−0.018	−0.003	−0.023	0.037	−0.055				
	(0.193)	(0.076)	(0.222)	(0.164)	(0.074)	(0.759)	(0.024)	(0.000)	(0.000)				
ΔEARN_CSTR	−0.004	0.013	−0.006	0.012	0.011	−0.218	−0.015	0.089	−0.029	0.045			
	(0.708)	(0.212)	(0.538)	(0.233)	(0.296)	(0.000)	(0.140)	(0.000)	(0.004)	(0.000)			
ΔCASH	0.017	0.023	0.002	0.044	0.075	−0.365	0.051	0.004	0.169	−0.031	0.031		
	(0.082)	(0.024)	(0.821)	(0.000)	(0.000)	(0.000)	(0.000)	(0.730)	(0.000)	(0.002)	(0.002)		
ΔLEV	−0.007	0.001	0.012	0.048	0.013	0.012	0.058	0.006	−0.053	0.229	0.053	−0.056	
	(0.467)	(0.899)	(0.216)	(0.000)	(0.200)	(0.242)	(0.000)	(0.579)	(0.000)	(0.000)	(0.000)	(0.000)	
ΔRISK_ID	0.007	0.037	0.007	−0.028	0.028	−0.012	−0.106	0.017	−0.097	−0.026	0.125	−0.022	0.065
	(0.514)	(0.000)	(0.510)	(0.006)	(0.006)	(0.253)	(0.000)	(0.088)	(0.000)	(0.011)	(0.000)	(0.031)	(0.000)

Note:
This table presents the descriptive statistics for the variables used to test the warning effect on options and their Pearson correlations. All variables are as defined in Appendix C. P-values are based on two-tailed significance levels and are reported in parentheses.

Table 4

Sample Distribution and Descriptive Statistics for Testing Turnover Hypothesis

Panel A: Cross-tabulation of Number of Warnings vs. Turnovers

Turnover	*Warning Sample*	*Non-warning Control Sample*	*Total*
TURN = 0	969	6,526	7,495
	94.54%	97.33%	96.96%
TURN = 1	56	179	235
	5.46%	2.67%	3.04%
	1,025	6,705	7,730
Total	100%	100%	100%
Test of two-sample turnover rate: Z-stat. = 4.30			

Panel B: Descriptive Statistics

	Full Sample N = 7,730					*Warning Sample N = 1,025*		*Non-warning Control Sample N = 6,705*		*Between sample (Warnings – Non-warnings)*	
	Mean	*Median*	*Q1*	*Q3*	*Std. Dev*	*Mean*	*Median*	*Mean*	*Median*	*T-stat*	*Wilcoxon stat*
TURN	0.030	0.000	0.000	0.000	0.172	0.055	0.000	0.027	0.000	4.859	4.852
ΔROA	−0.012	−0.003	−0.030	0.011	0.050	−0.024	−0.015	−0.010	−0.002	−8.433	−10.654
RET	0.064	0.042	−0.199	0.289	0.369	−0.055	−0.075	0.083	0.064	−11.234	−11.486
AGE_63	0.064	0.000	0.000	0.000	0.245	0.067	0.000	0.064	0.000	0.424	0.424
LOSS	0.180	0.000	0.000	0.000	0.384	0.186	0.000	0.179	0.000	0.607	2.410
FE_ADJ	−0.005	0.000	−0.012	0.007	0.023	−0.014	−0.007	−0.004	0.000	−13.198	−16.834
RETVAR	0.016	0.011	0.006	0.021	0.015	0.017	0.013	0.016	0.010	3.016	8.663
TENURE	8.561	6.000	4.000	11.000	7.247	8.588	6.000	8.557	6.000	0.128	−0.203

Note:
This table presents the descriptive statistics for the variables used to test the warning effect on CEO forced turnover. All variables are as defined in Appendix C.

© 2016 John Wiley & Sons Ltd

non-warnings firms experience such turnover, while 5.46% of warning firms experience CEO turnover. The two-sample proportion test is significant (z-stat. = 4.30). As illustrated in Panel B, warning firms exhibit lower accounting-based returns and stock returns, lower adjusted earnings surprises and higher stock volatility compared to non-warning firms.

4. RESEARCH DESIGN AND EMPIRICAL RESULTS

(i) The Effect of Warnings on CEO Compensation and Pay-Performance Sensitivity (PPS)

(a) Baseline Model: The Effect of Warnings on CEO Bonus and Bonus PPS

Our first two hypotheses address the question of whether CEO bonus compensation and PPS are affected by warnings. Our baseline regression estimates the change in bonus as a function of warnings (WARN) after controlling for the other determinants of bonuses but without taking self-selection into account:[11]

$$\begin{aligned}\Delta \ln(\text{BONUS}_{it}) = {} & \beta_0 + \beta_1 \Delta\text{ROA}_{it} + \beta_2 \text{RET}_{it} + \beta_3 \text{WARN}_{it} + \beta_4 \Delta\text{ROA}_{it} \times \text{WARN}_{it} \\ & + \beta_5 \text{RET}_{it} \times \text{WARN}_{it} + \beta_6 \text{MISSED}_{it} + \beta_7 \text{SURPRISE}_{it} + \beta_8 \Delta\text{SALE}_{it} \\ & + \beta_9 \text{LEV}_{it} + \beta_{10} \text{MB}_{it} + \beta_{11} \text{TENURE}_{it} + \beta_{12} \text{CHAIR}_{it} + \varepsilon_{it} \qquad (1)\end{aligned}$$

The dependent variable is the change in the natural logarithm of the CEO's bonus plus 1 from year t–1 to year t, where t is the year a warning is issued. The main variable of interest is WARN, an indicator variable, which equals 1 when a firm issues a warning in any quarter of the fiscal year, 0 otherwise. Warnings are usually issued in relation to a particular quarter result (the quarter in which a warning is issued). Warnings issued in the fourth quarter, however, could refer either to the fourth quarter result or to the whole year. Of the 420 warning observations we have that are issued in Q4, 68 specifically refer to annual results. However, as mentioned earlier, warnings are likely to be issued when the future outlook for the firm is poor. To the extent that the future outlook for a firm could deteriorate at any point, we hypothesize in the baseline model that all warnings are treated in the same way by compensation committees regardless of the quarter in which they are issued.

We control for both accounting-based return (ΔROA) and market-based return (RET) (Lambert and Larcker, 1987; and Sloan, 1993). Following the literature, we further control for firm characteristics that are likely to affect CEO compensation and PPS, such as firm size (Smith and Watts, 1992; and Farrell and Whidbee, 2003), leverage (Leone et al., 2006), and market-to-book ratio (Leone et al., 2006). We also include CEO-specific characteristics: TENURE and CEO_CHAIR. Both measures could proxy CEO entrenchment (Core et al., 1999). TENURE, on the other hand, is also a measure of reputation. Longer-tenured CEOs would likely have earned the position

11 Two recent studies by Lennox et al. (2012) and Larcker and Rusticus (2010) raise the concern that self-selection models are sometimes sensitive to model specifications and to the properties of the instrument variables used in the first stage. Both papers suggest that OLS results are more reliable when the self-selection model is less robust. Therefore, we present both OLS and self-selection models for most of the hypothesis tests in this paper.

© 2016 John Wiley & Sons Ltd

through excellent performance. We also include MISSED to account for CEOs' past ability to meet targets. Matsunaga and Park (2001) find that a CEO's annual bonus is adversely affected if at least twice a year earnings fall short of earnings for the same quarter of the previous year. Therefore, we include MISSED (defined as 1 if this year's EPS excluding extraordinary items is lower than last year's EPS, 0 otherwise). Missing targets in the same quarter in consecutive years is likely to reflect poorly on a CEO's ability and reputation.

Warnings are issued when managers' expectations of forthcoming quarterly or annual earnings are lower than the market consensus. Thus, the decision whether to warn is irrelevant when managers are expecting a positive earnings surprise. It is for this reason that our control sample includes only firms that have experienced a negative earnings surprise in at least one quarter of the fiscal year. In addition, as another measure to control for factors that affect the decision to warn, we include SURPRISE, which is defined through two steps as follows. First, we calculate the difference between the actual EPS and the most recent consensus analyst forecast one day before the first day of the third month of a fiscal quarter (i.e., one day before the confession window), scaled by the beginning-quarter share price for each quarter of the year.[12] Second, we pick the lowest quarterly value (i.e., the most negative earnings surprise) from the previous step because warnings are most likely to occur in quarters in which the surprise is most negative.[13]

In the baseline model, β_3 is the coefficient of interest when testing H1. An insignificant β_3 suggests that warnings have no impact on CEO bonus, while $\beta_3 < 0$ ($\beta_3 > 0$) indicates that issuing a warning has a negative (positive) effect on CEO bonus. As argued in H2, the sensitivity of bonus to stock returns is expected to be higher for warning firms than for non-warning firms, or $\beta_5 > 0$.

In estimating equation (1), we follow Core et al. (2003b) so that our baseline model includes year indicators to account for year-specific differences in the levels of compensation – e.g., the time trend in annual pay (Murphy, 1999) – and industry indicators to control for unobserved variations in CEO pay across industries – e.g., different demand for managerial talent across industries (Murphy, 1999). In addition, because we estimate equation (1) using panel data, there may be time-series correlations in the error-term within each firm. Ignoring this serial correlation could lead to underestimated standard errors and overestimated *t*-statistics (Cameron and Trivedi, 2005); therefore, we estimate standard errors using the Huber-White correction with clusters at the firm level.

(b) Self-selection Model: The Effect of Warnings on CEO Bonus and Bonus PPS

The decision to warn or not to warn is discretionary, and CEOs make this decision based on a number of considerations. To account for this decision, we need to have a model of "self-selection", using a series of variables, including firm characteristics.

12 We measure analyst consensus forecasts one day before the third month of each fiscal quarter because warnings are issued after the beginning of the third month of the fiscal quarter (the "confession window"). Therefore, this measure captures the difference between management and market expectations before the confession window.

13 This measure also addresses the concern that some firms may have previously provided guidance, and that the market consensus is similar to management's expectation at the beginning of the "confession window" examined in the study.

© 2016 John Wiley & Sons Ltd

These variables, however, may also affect CEO pay. Thus, without controlling for CEOs' self-selection to warn or not to warn, the findings in the baseline model could be driven by these variables or by unobserved variables that affect the decision to warn. Following Tucker (2007) and De Franco et al. (2013), we run a two-stage Heckman (1979) model with separate Inverse Mills Ratios (IMR) for warning firms and non-warning firms (see model specification in Appendix A, Part 1). Consistent with the prior literature (Tucker, 2007; and Ajinkya et al., 2005), in the first stage, we estimate the following probit regression of the decision to warn:[14]

$$\begin{aligned}\Pr(\text{WARN}_{it}=1) = \Phi(&\alpha_0+\alpha_1\text{RISK}_{it}+\alpha_2\text{LN\_MVE}_{it}+\alpha_3\text{UPDATE\_GUIDE}_{it}\\&+\alpha_4\text{PAST\_GUIDE}_{it}+\alpha_5\text{NUMEST}_{it}+\alpha_6\text{IOR}_{it}+\alpha_7\text{MISSED}_{it}\\&+\alpha_8\text{SURPRISE}+\alpha_9\text{MB}_{it}+\alpha_{10}\text{ROA\_STD}_{it}+\alpha_{11}\text{FD}_{it}\\&+\alpha_{12}\text{COMP\_STRUCTURE}_{it}+\alpha_{13}\text{TENURE}_{it}+\alpha_{14}BDSIZE_{it}\\&+\alpha_{15}\text{BDINDEP}_{it}+\alpha_{16}\text{GOVMISSING}_{it}+\varepsilon_{it})\end{aligned}\tag{2}$$

In the second stage, we calculate IMRs for warning groups $\varphi(Z_{it}'\gamma)/\Phi(Z_{it}'\gamma)$ and non-warning groups $-\varphi(Z_{it}'\gamma)/1-\Phi(Z_{it}'\gamma)$ and modify the baseline model by adding these two self-selection ratios:

$$\begin{aligned}\Delta\ln(\text{BONUS}_{it}) = &\beta_0+\beta_1\Delta\text{ROA}_{it}+\beta_2\text{RET}_{it}+\beta_3\text{WARN}_{it}+\beta_4\Delta\text{ROA}_{it}\times\text{WARN}_{it}\\&+\beta_5\Delta\text{RET}_{it}\times\text{WARN}_{it}+\beta_6\text{MISSED}_{it}+\beta_7\text{SURPRISE}_{it}+\beta_8\Delta\text{SALE}_{it}\\&+\beta_9\text{LEV}_{it}+\beta_{10}\text{MB}_{it}+\beta_{11}\text{TENURE}_{it}+\beta_{12}\text{CHAIR}_{it}\\&+\beta_{13}\text{IMR}_{it}\times\text{WARN}_{it}+\beta_{14}\text{IMR}_{it}\times(1-\text{WARN}_{it})+\varepsilon_{it}\end{aligned}\tag{3}$$

Note that we estimate equation (2) using annual data, while Tucker (2007) uses quarterly data. To control for general litigation risk, we include the predicted risk of being sued (RISK), and the size of the firm (LN_MVE). We also use the following two measures to control for the dynamic pattern of CEOs' past management forecast disclosures: (1) CEOs who have issued management forecasts in the past are more likely to issue forecasts regularly to maintain their reputation. UPDATE_GUIDE measures both whether a firm has provided guidance before the third fiscal month of the quarter and the necessity for CEOs to update the previous guidance. (2) If a firm has frequently issued guidance in the last year, it is more likely to issue a warning if the firm's performance is poor in the current year (PAST_GUIDE) because of reputation concern. A larger number of analysts (NUMEST) is likely to create a more transparent information environment for a firm; managers may, therefore, be more forthcoming (Lang and Lundholm, 1996). Two earnings performance measures, MISSED and SURPRISE, are also included, as a firm is more likely to issue a warning when it misses the previous year's earnings benchmark, and also when the market consensus is much higher than the managers' expectations of impending earnings. In addition,

14 All variables in model (2) are defined in Appendix C. Whether or not to issue a warning depends in part on the difference between the existing market expectation and the actual earnings (SURPRISE). Therefore, models to predict the issuance of warnings in the prior literature do not include actual performance measures. However, to assure that our results are robust, we also test all hypotheses after adding ROA in the first stage; results remain qualitatively the same.

© 2016 John Wiley & Sons Ltd

we include the market-to-book ratio (MB) to account for the growth potential of firms. Earnings volatility (ROA_STD) is also included, since Tucker (2007) shows that firms with more volatile earnings have less need to issue warnings. We also control for the number of institutional holdings (IOR) because managers are more likely to issue earnings guidance when institutional holdings increase (Anilowski et al., 2007). Heflin et al. (2003) report evidence that the volume of firms' earnings-related forward-looking disclosures increased after the implementation of Regulation Fair Disclosure (hereafter Regulation FD). On the other hand, Wang (2007) documents that firms previously relying on private earnings guidance replaced it with no guidance, instead of public guidance, after Regulation FD. We include an indicator variable, FD, to account for this regulation effect, but do not assign an expected sign.

We also include COMP_STRUCTURE and TENURE. COMP_STRUCTURE is a proxy to represent the importance of equity compensation relative to cash bonuses. If warnings affect compensation structure, then one might expect compensation structure at the warning date to influence the decision whether to warn; presumably CEOs with rational expectations understand that warnings will lead to subsequent changes in compensation structure. The concern of CEOs with stock price is expected to increase with this measure. As a result, we expect a positive relationship between this measure and the decision to warn. In addition, since the CEO's decision to warn or not to warn might be influenced by the governance structure of the firm, we include several governance variables in the regression. More specifically, we include BDSIZE, the size of the board; BDINDEP, board independence; and GOVMISSING, an indicator variable for firms that are missing corporate-governance-related information.

In summary, we expect a positive relationship between the probability of warning and the following variables: RISK, LN_MVE, UPDATE_GUIDE, PAST_GUIDE, NUMEST, IOR, MISSED, COMP_STRUCTURE and TENURE. We expect a negative relationship between the probability of warning and SURPRISE, MB and ROA_STD. Variable definitions are presented in Appendix C. The variable RISK is estimated following Johnson et al. (2001), Rogers and Stocken (2005) and Tucker (2007), and is presented in Appendix B. All variables in equation (3) are defined as in equation (1).

While both the Heckman model and the PSM model are used to mitigate the self-selection bias, their underlying assumptions differ. Heckman assumes that the main variables that determine self-selection are unobservable to researchers, while PSM assumes these variables are observable. We use the Heckman model because we believe that many factors that determine whether a CEO warns (facing negative surprises) are unobservable (e.g., desire to be credible or enhance reputation, concern for shareholders). While it is not possible to pinpoint what unobservable factors motivate CEOs to issue warnings, our view is that CEOs are concerned about how they will be perceived in the future by their compensation committees, boards and shareholders. All CEOs have track records, which determine their current reputation, but they are also concerned about future reputation. CEOs might want to enhance their current reputation, or, alternatively, want to coast by taking advantage of this reputation. While we include, in the first-stage, variables to control for the (current level of) reputation, we hypothesize that concern for future reputation, which will be based on the perception of CEOs' ability, integrity, credibility, transparency, etc., is likely to be the unobservable factor. We use multiple measures as proxies for current reputation,

© 2016 John Wiley & Sons Ltd

but we report the results using TENURE (CEO's tenure with the firm as CEO) as our main proxy to minimize the loss of observations. We expect that the reputation of a CEO increases with TENURE. We also use two alternative proxies of reputation in our robustness check section.[15]

Lennox et al. (2012) point out that a common problem in implementing the Heckman Selection Model is that accounting researchers use the model with arbitrary, or even no, exclusion restrictions. As a result, the Inverse Mills Ratios estimated from the first stage without valid exclusion restrictions will suffer a high multicollinearity problem in the second-stage regression. To avoid this potential problem, we first select multiple exclusion restrictions, including RISK, UPDATE_GUIDE, PAST_GUIDE, NUMEST and IOR, according to economic rationales rather than arbitrary choices. These variables theoretically affect a firm's decision to warn, but are not correlated with the choice of compensation change in bonus or option, or with the possibility of forced CEO turnover. Second, we perform a multicollinearity test by examining the Variance Inflation Factors(VIF) value.[16]

(c) The Effect of Warnings on CEO Option Grants and Option-Performance Sensitivity

We follow the specification in Cheng and Farber (2008) to test the changes in option grants after warnings are issued. Similarly to the test of the changes in a CEO's bonus after a warning has been issued, this test adopts a difference-in-differences approach where all variables are calculated as the difference between year t and t–1 except for the variable of interest (WARN) issued in year t. We use three measures of stock-based compensation awards: the natural logarithm of the Black-Scholes value of annual option grants, the natural logarithm of the actual number of option grants, and the ratio of the Black-Scholes value of option grants to total annual compensation, denoted as ln(OPTION$), ln(OPTION#) and OPTION%, respectively.

We control for CEO ownership (SHARES_OWN, EXER_OPT), four standard determinants of compensation (SIZE, MB, R&D, RET), the choice between cash compensation and equity compensation (CASH_CSTR, EARN_CSTR, CASH), and agency costs (LEV, RISK_ID). Prior studies find that when CEOs' equity holdings are low, firms often adjust their compensation structures by awarding more stock and options (Core and Guay, 1999; and Bryan et al., 2000). We use two proxies to measure CEO ownership: the actual number of shares owned (SHARES_OWN) and the number of exercisable options (EXER_OPT), both of which are scaled by the number of outstanding shares.[17] As firm size increases, a business becomes more

15 As robustness test (untabulated), we use OUTCEO and STD_DACC as two alternative measures of overall reputation. OUTCEO is 1 if a CEO is appointed from outside, 0 otherwise. STD_DACC proxies earnings quality and is measured by the standard deviation of the discretionary accruals of the last 4 years (Francis et al., 2008). While these are proxies for overall reputation, we expect that past warning behavior also, though more narrowly, affects the current level of CEOs reputation. Our test results for both the first stage and the second stage remain the same.

16 See Lennox et al. (2012), p. 602, Note 5, "Multicollinearity is typically regarded as high (very high) when the variance-inflation-factions (VIFs) exceed 10 (20)".

17 Options are excluded when calculating SHARES_OWN to avoid a mechanical relationship between SHARES_OWN and new option grants. We include the number of options (EXER_OPT) to account for the existing options granted in previous years. This variable is less likely to create a mechanical relationship with the dependent variable because new options are usually not exercisable until several years later. Because Compustat includes new grants as unexercisable, we do not use it as a control variable.

© 2016 John Wiley & Sons Ltd

complex and generally requires more able CEOs with higher compensation than do smaller firms. In addition, larger firms are more difficult to monitor, and firms, therefore, use more incentive-based compensation plans to reduce potential agency conflicts (Smith and Watts, 1992; and Core and Guay, 1999). We include the natural logarithm of sales as a measure of firm size (SIZE). Similarly, firms with greater growth opportunities are likely to rely on incentive-based compensation to better align the interests of CEOs and shareholders (Myers, 1977; Smith and Watts, 1992; and Bryan et al., 2000). We, therefore, include the market-to-book ratio (MB) and research and development expenditures (R&D) as proxies for growth opportunities, but we make no prediction regarding the sign of the coefficient on R&D because evidence on R&D and stock-based compensation is mixed (Cheng and Farber, 2008). CEO compensation is positively associated with performance measures, and so we include stock returns (RET) to measure firm performance (Baber et al., 1996).

Firms that are more cash-constrained tend to use stock-based compensation more heavily (Yermack, 1995). To measure cash constraints, we use common and preferred dividends minus cash flows from investment activities minus cash flows from operating activities, divided by total assets (CASH_CSTR). Until 2005, firms were not required to recognize expenses when options were granted, and consequently, firms with earnings lower than earnings targets preferred to grant options for financial reporting purposes.[18] Therefore, following Cheng and Farber (2008), we include earnings constraints (EARN_CSTR), measured as an indicator variable of an operating loss, to account for the advantage of using option compensation over cash compensation. Guay (1999) argues that greater cash compensation reduces the need to use option grants to encourage CEOs to invest in risky and positive NPV projects because more cash compensation enables CEOs to better diversify their risks. We include total cash compensation divided by sales (CASH) as another control variable. However, the evidence on the relationship between earnings constraints and option grants, and between cash compensation and option grants, is not conclusive, so we do not assign signs for these two variables.

Since shareholders benefit more from incentive-based compensation than do debtholders (Bryan et al., 2000), highly-leveraged firms (greater shareholder–debtholder conflicts) will have incentives to reduce stock-based compensation. We measure leverage (LEV) as long-term debt over total assets. Idiosyncratic risk (RISK_ID) is also added to the model because greater RISK_ID means that a firm is more difficult to monitor. RISK_ID is measured as the standard deviation of the residual from the market model using weekly returns over the past 12 months.

The model also includes year and industry dummies, and estimates statistical significance using Huber-White robust standard errors to adjust for heteroscedasticity and within-firm time-series correlation. To test H3 and H4, we estimate the following model after controlling for self-selection:

$$\begin{aligned}\Delta \ln(\text{OPTION\$}_{it}) = {} & \beta_0 + \beta_1 \text{WARN}_{it} + \beta_2 \Delta\text{RET}_{it} \times \text{WARN}_{it} + \beta_3 \Delta\text{SHARES\_OWN}_{it} \\ & + \beta_4 \Delta\text{EXER\_OPT}_{it} + \beta_5 \Delta\text{SIZE}_{it} + \beta_6 \Delta\text{MB}_{it} + \beta_7 \Delta\text{R\&D}_{it} \\ & + \beta_8 \Delta\text{RET}_{it} + \beta_9 \Delta\text{CASH\_CSTR}_{it} + \beta_{10} \Delta\text{EARN\_CSTR}_{it}\end{aligned}$$

18 If options are granted in the money, however, firms are required to recognize the expense even before SFAS 123R. Nonetheless, most firms grant options at the money, so expensing options is less of a concern before SFAS 123R.

© 2016 John Wiley & Sons Ltd

$$+ \beta_{11}\Delta\text{CASH}_{it} + \beta_{12}\Delta\text{LEV}_{it} + \beta_{13}\Delta\text{RISK\_ID}_{it}$$
$$+ \beta_{14}\text{IMR}_{it} \times \text{WARN}_{it} + \beta_{15}\text{IMR}_{it} \times (1 - \text{WARN}_{it}) + \varepsilon_{it} \quad (4)$$

We also estimate the same model with $\Delta\ln(\text{OPTION\#})$ and $\Delta\text{OPTION\%}$ as dependent variables. All changes are calculated as the difference between year t–1 and year t where t is the year in which a warning is issued. H3 and H4 predict that both β_1 and β_2 are positive and significant, suggesting that warning CEOs tend to receive more option grants than do non-warning CEOs and that option PPS increases for warning CEOs.

(d) Effect of Warnings Issued in Different Quarters on CEO Compensation

One may argue that warnings issued in earlier quarters, say the first quarter and the second quarter, are less likely to affect CEO compensation because they are issued almost a year before compensation committees decide on bonus and option grants, and it is possible that firms have a chance to recover in the second half of the year. Alternatively, some CEOs might be reluctant to issue warnings in the early quarters of a year, hoping that firm performance will improve. In that case, the timing of a warning could be a strategic decision. Therefore, we test if the warning quarter makes a difference in impact on compensation by identifying the quarter in which each warning is issued. To do so, we replace the variable WARN by four dummy variables, Q1, Q2, Q3 and Q4 as the stand-alone variables. To estimate the association between warnings and compensation, we also include interactive terms with RET and repeat our analyses.

(e) Test Results on Cash and Option-based Compensation

Table 5 presents the first-stage probit analysis of the decision to warn. The explanatory power of the overall model is 8.90%, comparable to the 9.15% documented in Tucker (2007). As expected, CEOs are more likely to warn if their firms have a higher probability of being sued, have previously issued guidance in the event quarter, have frequently issued guidance in the last year, have more analysts following the firm, have experienced an earnings shortfall, have suffered a larger negative earnings surprise, and have lower earnings volatility. Consistent with Wang (2007), we find FD to have a negative and significant sign. Contrary to our prediction, however, LN_MVE is negative and significant, and MB is negative but not significant, suggesting that larger firms and growth firms tend not to issue warnings.[19] Lee et al. (2012), using a sample similar to our study, also show a significant negative coefficient on firm size when predicting the decision to issue management guidance. As expected, COMP_STRUCTURE is positive and significant. However, CEOs' tenure does not appear to influence the likelihood

19 There may be two reasons for this result: (1) Our sample firms are significantly larger than those in Tucker (2007), with the mean size of our (her) warning firms and non-warning firms equal to US$ 1,581.30 (US$ 432) million and US$ 1,895.04 (US$ 226) million, respectively. Evidence provided in Wang (2007) suggests that larger firms were more likely to provide *private* earnings guidance before Regulation FD was enacted; (2) Our sample period includes eight more years in the post Regulation FD environment than the sample in Tucker (2007). Wang (2007) also shows that after Regulation FD, firms that previously relied more heavily on private guidance stopped providing any guidance at all rather than starting to issue public guidance.

© 2016 John Wiley & Sons Ltd

Table 5
First Stage Probit Analysis of the Choice to Issue Warnings

Independent Variables	*Predicted Sign*	*Coefficient*	*Robust Std Err*	*P-value*
Intercept		0.229	0.160	0.152
RISK	+	3.145	0.600	0.000
LN_MVE	+	−0.173	0.019	0.000
UPDATE_GUIDE	+	0.565	0.043	0.000
PAST_GUIDE	+	0.028	0.005	0.000
NUMEST	+	0.012	0.004	0.001
IOR	+	−0.136	0.088	0.062
MISSED	+	0.372	0.034	0.000
SURPRISE	−	−1.296	0.577	0.013
MB	+	−0.007	0.006	0.121
ROA_STD	−	−1.028	0.317	0.001
FD		−0.358	0.043	0.000
COMP_STRUCTURE	+	0.000	0.000	0.082
TENURE	+	−0.027	0.019	0.077
BDSIZE		0.003	0.008	0.692
BDINDEP		−0.586	0.123	0.000
GOVMISSING		−0.599	0.113	0.000
Pseudo R^2		0.0890		
Number of obs.		10,289		

Note:
This table reports the results of the first-stage regression of the decision to warn. All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on one-tailed tests for variables with predicted signs and two-tailed tests for variables without predicted signs.

of issuing warnings. A possible reason is that we already have three variables that might directly influence and are highly correlated with CEOs' reputation with respect to management guidance behavior: UPDATE_GUIDE, PAST_GUIDE and NUMEST. We also find that the more independent the board, the less likely the CEO is to issue warnings. In addition, it is worth noting that the instrument variables (RISK, UPDATE_GUIDE, PAST_GUIDE, NUMEST) in the first stage are all significantly related to the decision to warn, with the exception of IOR. Additionally, we test the VIF value to measure the degree of multicollinearity problem in our main models. Untabulated results show that VIF = 1.20 for the bonus regression, VIF = 1.02, 1.04 and 1.02 for the option regression for all three option measures, and VIF = 1.08 for the turnover regression. None of them indicate multicollinearity problems.

Table 6, Panel A, reports the regression results for the baseline model for bonus compensation without and with control for self-selection. Since all the variables that are significant in the baseline model without self-selection remain significant in the model with self-selection, our discussion focuses on the bonus regression model after self-selection is controlled for. Warnings have an incremental, negative effect on the change in CEO bonus ($\beta_3 = -1.132$ with $p = 0.010$), indicating that CEO bonuses will be adversely affected if a warning is issued during the year. CEO bonuses are negatively affected, presumably because compensation committees find that a warning reveals information beyond the reported firm performance measures. In particular, such a warning signals potential long-term earnings losses. It may also be possible that the compensation committee is concerned about the negative market reaction to a

© 2016 John Wiley & Sons Ltd

Table 6

Testing the Relation between Change in CEO Bonus and Warnings

		No control for self-selection			*Control for self-selection*		
Independent Variables[1]	*Predicted Sign*	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*
Panel A: The Baseline Model							
Intercept		0.056	0.157	0.723	−0.009	0.163	0.958
ΔROA	+	1.584	0.435	0.000	1.639	0.435	0.000
RET	+	0.771	0.076	0.000	0.776	0.076	0.000
WARN		−0.688	0.094	0.000	−1.132	0.439	0.010
ΔROA×WARN		1.523	1.345	0.257	1.025	1.362	0.452
RET×WARN	+	0.564	0.272	0.019	0.524	0.271	0.027
MISSED	−	−0.586	0.064	0.000	−0.607	0.068	0.000
SURPRISE	+	0.380	1.095	0.365	0.431	1.093	0.347
ΔSALE	+	0.584	0.146	0.000	0.577	0.147	0.000
LEV		0.109	0.150	0.468	0.112	0.151	0.456
MB		−0.032	0.009	0.000	−0.031	0.009	0.000
TENURE	−	−0.023	0.029	0.216	−0.022	0.029	0.228
CEO_CHAIR	+	0.171	0.107	0.055	0.169	0.107	0.058
IMR×WARN					0.344	0.271	0.205
IMR×(1−WARN)					−0.341	0.236	0.149
Year dummy			Yes			Yes	
Industry dummy			Yes			Yes	
Adjusted R^2			0.1564			0.1566	
Number of obs.			10,289			10,289	
Panel B: The Modified Model							
Intercept		0.303	0.254	0.232	0.187	0.270	0.489
ΔROA	+	2.204	0.606	0.000	2.447	0.608	0.000
RET	+	0.487	0.096	0.000	0.488	0.096	0.000
Q1		−1.262	0.247	0.000	−2.153	0.513	0.000
Q2		−0.741	0.222	0.001	−1.591	0.476	0.001
Q3		−0.880	0.164	0.000	−1.736	0.473	0.000
Q4		−0.801	0.180	0.000	−1.685	0.477	0.000
RET×Q1	+	0.897	0.668	0.090	0.888	0.666	0.091
RET×Q2	+	1.231	0.594	0.019	1.176	0.586	0.023
RET×Q3	+	0.827	0.494	0.048	0.663	0.486	0.086
RET×Q4	+	0.169	0.475	0.361	0.069	0.481	0.443
ΔROA×WARN		1.941	1.496	0.195	0.508	1.556	0.744
MISSED	−	−0.421	0.087	0.000	−0.416	0.105	0.000
SURPRISE	+	1.904	2.341	0.208	1.999	2.786	0.237
ΔSALE	+	0.291	0.203	0.076	0.280	0.202	0.083
LEV		0.126	0.230	0.583	0.150	0.231	0.516
MB		−0.037	0.012	0.003	−0.038	0.012	0.002
TENURE	−	0.007	0.046	0.440	0.006	0.046	0.445
CEO_CHAIR	+	−0.012	0.188	0.474	−0.023	0.190	0.453
IMR×WARN					0.761	0.299	0.011
IMR×(1−WARN)					−0.336	0.306	0.273
Year dummy			Yes			Yes	
Industry dummy			Yes			Yes	
Adjusted R^2			0.1956			0.1972	
Number of obs.			5,291			5,291	

(*Continued*)

© 2016 John Wiley & Sons Ltd

Table 6
Continued

		No control for self-selection			*Control for self-selection*		
Independent Variables[1]	*Predicted Sign*	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*
Panel B: The Modified Model							
Test							
Q1 = Q2	F = 2.46		p = 0.117			F = 3.33	p = 0.068
Q1 = Q3	F = 0.05		p = 0.828			F = 2.16	p = 0.142
Q1 = Q4	F = 0.13		p = 0.722			F = 2.56	p = 0.110
RET×Q1 = RET×Q2	F = 0.83		p = 0.362			F = 0.11	p = 0.742
RET×Q1 = RET×Q3	F = 2.14		p = 0.144			F = 0.08	p = 0.779
RET×Q1 = RET×Q4	F = 1.01		p = 0.316			F = 1.05	p = 0.306

Note:
This table reports the results of regression analyses of the effect of warnings on CEO bonus (Panel A) and the effect of warnings issued in different quarters on CEO bonus (Panel B). All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on one-tailed tests for variables with predicted signs and two-tailed tests for variables without predicted signs.

warning (Matsunaga and Park, 2001).The coefficient on RET×WARN is positive and significant, consistent with our hypothesis.

As for the control variables, both firm performance measures (ΔROA and RET) are significantly positively related to changes in bonus. The coefficient on ΔROA×WARN is insignificant at conventional levels, which suggests that warnings do not affect the sensitivity of bonuses to accounting measures. Consistent with Matsunaga and Park (2001), CEO cash bonuses are reduced when the current year's earnings fall below those of the previous years ($\beta_6 = -0.607$ with $p = 0.000$). We do not find a significant result on SURPRISE, which might be caused by its high correlation with other performance measures (Table 2 shows that SURPRISE has a significantly positive correlation with ΔROA, RET and ΔSALE, and a significantly negative correlation with MISSED). As expected, we find that an increase in sales leads to an increase in cash bonuses, and consistent with Albuquerque (2009), we find that CEO bonus change is higher for less experienced CEOs. The coefficient on self-selection term is an estimate of the product of the standard deviation of the error term in equation (1) and the correlation between the error terms in equation (1) and equation (2). The coefficients on IMR are insignificant for both warning and non-warning CEOs.

Panel B of Table 6 reports the results when we replace WARN by quarter indicators.[20] We find that the coefficient estimates for the quarter indicators are all negative and significant (coefficients with self-selection are −2.153, −1.591 −1.736 and −1.685 for Q1, Q2, Q3 and Q4, respectively and $p < 0.001$ for all). F-tests suggest that those coefficients are not different from each other. Except for the coefficient on RET×Q4, the coefficients on the RET interactive terms are positive and marginally significant. The coefficient on IMR for warning firms (IMR×WARN) is significantly positive ($\beta_{19} = 0.761$ with $p = 0.011$) in the modified model, although it was not significant in the

20 The sample size for the modified model (Panel B) decreases to 5,291 because the quarterly tests require us to (1) limit warning firms to those that issue a warning only once during a year; (2) limit non-warning firms to those that only experience negative earnings surprise in one quarter of a year.

© 2016 John Wiley & Sons Ltd

baseline model. This indicates that unobserved factors that increase the likelihood of issuing a warning lead to an increase in bonus change. As we already discussed, these unobserved factors could include the concern of CEOs about their future reputation; that is, CEOs who are concerned with the perception of their ability/credibility are more likely to issue warnings. There is no self-selection effect on the non-warning group (β_{20} has a p-value of 0.273). All other variables are similar to the results in Table 6, Panel A. In summary, it appears that warnings issued in different quarters exert a similar impact on CEO bonus.

Next, we discuss the results of the regression analysis on CEO option compensation. Table 7 (Panel A with WARN and Panel B with quarter indicators) uses all three option grant measures to test whether warning firms grant more options than do non-warning firms. Specifically, the coefficients on WARN for $\Delta\ln$(OPTION\$), $\Delta\ln$(OPTION#) and ΔOPTION% are 0.593 ($p = 0.076$), 0.605 ($p = -0.020$) and 0.779 ($p = 0.049$), respectively, suggesting that changes in all three option measures are significantly higher for warning firms than for non-warning firms. The coefficients on ΔRET×WARN, however, are insignificant for the US\$ value of option grants and the number of grants, while the coefficient on option percentage is negative and significant. These results do not support the hypothesis about PPS to stock returns. Most of the control variables with a directional prediction have the expected sign. More specifically, compensation in the form of stock options is greater for firms with lower levels of CEO ownership and for those with better performance. In addition, the coefficients on IMR×WARN are all negative and significant, indicating that unobservable factors that lead managers to issue warnings reduce CEO option grants. Collectively, the results lend support to H3 that warning firms tend to grant more options ($\Delta\ln$(OPTION\$), $\Delta\ln$(OPTION#)) than do non-warning firms, and that the compensation structure of warning firms (ΔOPTION%) tends to be modified from cash-based compensation toward more high-powered, equity-based compensation. The results with quarter indicators are largely consistent with the baseline model. We find that $\Delta\ln$(OPTION#) is positively associated with warnings in all quarters ($p < 0.05$). The sensitivity of options to ΔRET is negative but insignificant in all quarters except Q1.

Finally, a word of caution seems appropriate regarding the inferences about stock option grants. Although options are usually granted annually, they can be awarded anytime during the year. That means that while we have established an association, to establish causality, we need to check, at a minimum, whether the options are granted after warnings are issued. However, option grant dates are not required to be disclosed, so their duration and expiration dates need to be collected from proxy statements in order to infer the grant dates. While we cannot assume that options are granted only once a year at the time of bonus granting, the association we find between the warnings and $\Delta\ln$(OPTION#) is consistent with causality. Clearly, options granted in an earlier part of the year cannot incorporate warnings issued subsequently. However, a warning issued in any quarter can affect the options granted afterward. Thus, the positive associations we find between quarterly warnings and $\Delta\ln$(OPTION#) suggest that, on average, warnings do affect the granting of options.[21]

21 We also test if the number of warnings in a year affects compensation (untabulated). We find that the number does not affect compensation directly, but does increase the bonus and option sensitivity to stock returns. Given that warnings seem to be distributed across quarters in a more-or-less even manner, it appears that conscientious CEOs are willing to provide timely warnings on an as-needed basis and that compensation committees, in turn, treat the warnings similarly regardless of the quarter in which they are made.

© 2016 John Wiley & Sons Ltd

Table 7

Testing the Relationship between Change in CEO Option Grants and Warnings after Controlling for Self-selection

		Δln(OPTION$)			*Δln(OPTION#)*			*ΔOPTION%*		
Dependent Variables / *Independent Variables*	*Predicted Sign*	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*
Panel A: The Baseline Model										
Intercept		0.239	0.146	0.101	0.132	0.104	0.205	0.168	0.120	0.161
WARN	+	0.593	0.413	0.076	0.605	0.292	0.020	0.779	0.471	0.049
ΔRET×WARN	+	−0.145	0.162	0.187	−0.006	0.117	0.479	−0.310	0.192	0.054
ΔSHARES_OWN	−	−0.006	0.003	0.008	−0.004	0.002	0.010	−0.006	0.003	0.012
ΔEXER_OPT	−	−0.040	0.011	0.000	−0.026	0.008	0.001	−0.053	0.012	0.000
ΔSIZE	+	0.149	0.201	0.228	−0.048	0.145	0.371	−0.690	0.224	0.001
ΔMB	+	0.007	0.019	0.361	−0.011	0.015	0.224	0.028	0.023	0.110
ΔRD		−3.629	2.744	0.186	−2.036	2.023	0.314	−11.570	3.844	0.003
ΔRET	+	0.056	0.070	0.211	0.119	0.052	0.011	−0.192	0.079	0.008
ΔCASH_CSTR		−0.340	0.259	0.095	−0.299	0.188	0.056	0.269	0.266	0.156
ΔEARN_CSTR		−0.016	0.144	0.913	0.046	0.108	0.669	0.261	0.148	0.079
ΔCASH		0.059	0.069	0.390	0.033	0.049	0.503	−0.581	0.078	0.000
ΔLEV	−	−0.230	0.553	0.339	0.139	0.402	0.365	−0.416	0.549	0.225
ΔRISK_ID	+	−4.358	2.257	0.027	−0.704	1.685	0.338	−0.035	2.235	0.494
IMR×WARN		−0.487	0.271	0.073	−0.416	0.192	0.031	−0.578	0.304	0.058
IMR×(1−WARN)		−0.045	0.269	0.868	−0.295	0.192	0.124	−0.077	0.283	0.787
Year dummy			Yes			Yes			Yes	
Industry dummy			Yes			Yes			Yes	
Adjusted R^2			0.0106			0.0117			0.0295	
Number of obs.			9,947			9,947			9,947	

(*Continued*)

© 2016 John Wiley & Sons Ltd

© 2016 John Wiley & Sons Ltd

Table 7
Continued

Dependent Variables / *Independent Variables*	*Predicted Sign*	*Δln(OPTION$)* Coeff.	Robust Std. Err	P-value	*Δln(OPTION#)* Coeff.	Robust Std. Err	P-value	*ΔOPTION%* Coeff.	Robust Std. Err	P-value
Panel B: The Modified Model										
Intercept		0.225	0.237	0.343	0.056	0.166	0.736	0.139	0.198	0.482
Q1	+	0.477	0.450	0.145	0.647	0.326	0.024	0.539	0.505	0.143
Q2	+	0.600	0.436	0.085	0.713	0.309	0.011	0.651	0.473	0.085
Q3	+	0.655	0.444	0.070	0.739	0.315	0.010	0.710	0.523	0.087
Q4	+	0.761	0.437	0.041	0.802	0.315	0.006	0.522	0.518	0.157
ΔRET×Q1	+	−0.789	0.454	0.041	−0.467	0.312	0.068	−0.875	0.349	0.006
ΔRET×Q2	+	0.194	0.422	0.323	0.232	0.293	0.214	0.120	0.383	0.377
ΔRET×Q3	+	−0.240	0.263	0.181	−0.046	0.201	0.410	−0.401	0.380	0.146
ΔRET×Q4	+	−0.071	0.336	0.417	0.061	0.241	0.401	−0.506	0.408	0.108
ΔSHARES_OWN	−	−0.006	0.004	0.041	−0.004	0.002	0.053	−0.006	0.004	0.061
ΔEXER_OPT	−	−0.030	0.015	0.020	−0.019	0.011	0.041	−0.034	0.018	0.028
ΔSIZE	+	0.188	0.306	0.270	−0.081	0.219	0.356	−0.528	0.339	0.060
ΔMB	+	0.066	0.029	0.013	0.032	0.022	0.074	0.054	0.037	0.072
ΔRD		−1.541	3.980	0.699	−0.889	2.888	0.758	−7.003	5.628	0.214
ΔRET	+	0.088	0.097	0.181	0.135	0.070	0.026	−0.084	0.110	0.223
ΔCASH_CSTR		−0.453	0.365	0.108	−0.392	0.260	0.066	0.405	0.384	0.146
ΔEARN_CSTR		0.061	0.221	0.781	0.061	0.163	0.709	0.319	0.267	0.232
ΔCASH		−0.003	0.093	0.974	−0.020	0.065	0.762	−0.608	0.106	0.000

(*Continued*)

Table 7
Continued

Dependent Variables / *Independent Variables*	*Predicted Sign*	*Δln(OPTION$)* Coeff.	*Δln(OPTION$)* Robust Std. Err	*Δln(OPTION$)* P-value	*Δln(OPTION#)* Coeff.	*Δln(OPTION#)* Robust Std. Err	*Δln(OPTION#)* P-value	*ΔOPTION%* Coeff.	*ΔOPTION%* Robust Std. Err	*ΔOPTION%* P-value
Panel B: The Modified Model										
ΔLEV	−	−0.225	0.797	0.389	0.350	0.564	0.268	−0.348	0.763	0.324
ΔRISK_ID	+	−2.669	3.124	0.197	0.235	2.271	0.459	0.184	3.302	0.478
IMR×WARN		−0.588	0.296	0.047	−0.535	0.210	0.011	−0.485	0.348	0.163
IMR×(1−WARN)		−0.103	0.288	0.721	−0.381	0.213	0.074	−0.045	0.296	0.880
Year dummy			Yes			Yes			Yes	
Industry dummy			Yes			Yes			Yes	
Adjusted_R^2			0.0116			0.0133			0.0202	
Number of obs.			5,099			5,099			5,099	
Test										
Q1 = Q4		F = 0.13		p = 0.715	F = 0.08		p = 0.782	F = 0.13		p = 0.723
Q2 = Q4		F = 0.33		p = 0.567	F = 0.17		p = 0.679	F = 0.31		p = 0.575
Q3 = Q4		F = 0.79		p = 0.374	F = 0.44		p = 0.508	F = 0.00		p = 0.958
ΔRET×Q1 = ΔRET×Q4		F = 2.62		p = 0.106	F = 2.76		p = 0.097	F = 4.00		p = 0.046
ΔRET×Q2 = ΔRET×Q4		F = 1.14		p = 0.286	F = 1.34		p = 0.248	F = 0.94		p = 0.333
ΔRET×Q3 = ΔRET×Q4		F = 1.69		p = 0.194	F = 1.88		p = 0.171	F = 0.49		p = 0.484

Note:
This table reports the results of regression analyses of the effect of warnings on CEO option grants (Panel A) and the effect of warnings issued in different quarters on CEO option grants (Panel B). All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on one-tailed tests for variables with predicted signs and two-tailed tests for variables without predicted signs.

© 2016 John Wiley & Sons Ltd

Table 8
Testing the Relationship between Change in CEO Total Compensation and Warnings

		$\Delta ln(TOTAL)$		
Independent Variables	*Predicted Sign*	*Coeff.*	*Robust Std. Err*	*P-value*
Intercept		0.086	0.049	0.077
ΔROA	+	−0.048	0.138	0.366
RET	+	0.257	0.025	0.000
WARN		−0.010	0.109	0.924
ΔROA×WARN		0.358	0.446	0.423
RET×WARN		−0.042	0.075	0.576
MISSED	−	−0.074	0.018	0.000
SURPRISE	+	0.929	0.341	0.004
ΔSALE	+	0.242	0.042	0.000
LEV		−0.044	0.040	0.272
MB		0.001	0.003	0.748
TENURE	−	0.005	0.008	0.286
CEO_CHAIR	+	0.024	0.033	0.235
IMR×WARN		−0.040	0.067	0.557
IMR×(1−WARN)		−0.010	0.068	0.880
Year dummy			Yes	
Industry dummy			Yes	
Adjusted R^2			0.0480	
Number of obs.			10,289	

Note:
This table reports the results of regression analysis of the effect of warnings on CEO total compensation. All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on two-tailed tests since no directional predictions are made for warning vs. non-warning CEOs.

(f) Test Results on Total Compensation

We have shown that CEOs of warning firms are penalized with respect to their bonuses, but, in exchange, receive more option grants. A natural follow-up question is: what is the net effect? To answer this question, we test how warnings affect total compensation, which is the sum of salary, bonus, long-term incentive payouts, restricted stock granted, value of stock options granted and all other compensation in a given year. *Ex ante*, we do not have a predicted sign for the coefficient on WARN. We use the same specification as the model on bonuses, but use total compensation as the dependent variable. Since this specification may omit other important variables that determine total compensation, we need to interpret the results with caution. The results in Table 8 show that the coefficient on WARN is negative but insignificant, suggesting that the reduced bonus is offset by increased stock-based compensation. It is worth reiterating, however, that the compensation mix is modified towards stock-based compensation in the year in which warnings are issued. As expected, the timing of warnings does not affect total compensation (untabulated).

(ii) Testing Potential Benefits/Costs of Issuing Warnings: CEO Turnover

To see if CEO-specific benefits/costs exist for warning firms, we next examine whether CEO forced-turnover rates are affected by the issuance of warnings. Given that these

© 2016 John Wiley & Sons Ltd

firms tend to be performing poorly, we expect job retention to be an important concern for their CEOs.

(a) Research Design

The model for testing the turnover hypothesis is based on DeFond and Park (1999). We focus on WARN to test H5. We also include an interaction term between RET and WARN. Warnings could affect turnover in two ways: influencing turnover directly and influencing it indirectly through PPS. We augment the model by adding controls for losses, and CEO tenure. Since we do not know whether warnings affect the sensitivity of turnover to other control variables, we also include interaction terms to account for any potential effect of this kind (including ΔROA). Specifically, we estimate the following model:

$$\begin{aligned}\Pr(\text{TURN}_{it+1}) = \Phi(&\beta_0 + \beta_1 \Delta\text{ROA}_{it} + \beta_2 \text{RET}_{it} + \beta_3 \text{WARN}_{it} + \beta_4 \Delta\text{ROA}_{it} \times \text{WARN}_{it} \\ &+ \beta_5 \text{RET}_{it} \times \text{WARN}_{it} + \beta_6 \text{AGE\_63}_{it+1} + \beta_7 \text{LOSS}_{it} + \beta_8 \text{FE\_ADJ}_{it} \\ &+ \beta_9 \text{RETVAR}_{it} + \beta_{10} \text{TENURE}_{it} + \beta_{11} \text{AGE\_63}_{it+1} \times \text{WARN}_{it} \\ &+ \beta_{12} \text{LOSS}_{it} \times \text{WARN}_{it} + \beta_{13} \text{FE\_ADJ}_{it} \times \text{WARN}_{it} \\ &+ \beta_{14} \text{RETVAR}_{it} \times \text{WARN}_{it} + \beta_{15} \text{TENURE} \times \text{WARN}_{it} \\ &+ \beta_{16} \text{IMR} \times \text{WARN}_{it} + \beta_{17} \text{IMR} \times (1 - \text{WARN}_{it}) + \varepsilon_{it}) \end{aligned} \quad (5)$$

TURN equals 1 if a CEO is forced out in the following year, and 0 otherwise. The variables of interest are WARN and RET×WARN. As for control variables, we include ΔROA and RET. We also include a dummy variable for those CEOs that are 63 years of age and older (AGE_63) and for CEO tenure (TENURE) as control variables to capture the well-documented age effect on CEO turnover (Murphy and Zimmerman, 1993; and DeFond and Park, 1999). We do not have an expectation on the sign of the coefficients for these two variables. On the one hand, the literature shows that older and longer-tenured CEOs are more likely to experience turnover; on the other hand, these CEOs are more likely to voluntarily leave the firm and less likely to be forced out.

Prior research documents that 1-year-ahead analyst forecast error captures the deviation of realized earnings from expectations and provides additional information regarding a CEO's ability (Puffer and Weintrop, 1991; DeFond and Park, 1999; and Farrell and Whidbee, 2003). We calculate the adjusted analyst forecast error (FE_ADJ) as the difference between the realized EPS for the previous year and the forecasted EPS at the beginning of that year, scaled by the stock price at the beginning of the year. We expect FE_ADJ to be negatively associated with TURN. Stock volatility (RETVAR) has been shown to be positively associated with a CEO retention decision (DeFond and Park, 1999; and Engel et al., 2003). We measure stock volatility as the variance of monthly returns during the 24-month period prior to the event year. We also replace WARN by Qi, $i = 1,2,3,4$, to test if the timing of the issuance of warnings matters.

© 2016 John Wiley & Sons Ltd

Table 9
Analysis of Warnings on CEO Forced Turnover

		No control for self-selection			*Control for self-selection*		
Independent Variables	*Predicted Sign*	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*
Intercept		−1.678	0.130	0.000	−1.694	0.126	0.000
ΔROA	−	0.676	0.745	0.182	0.664	0.769	0.194
RET	−	−0.326	0.116	0.003	−0.327	0.117	0.003
WARN		0.396	0.142	0.005	0.606	0.362	0.094
ΔROA×WARN		−0.909	1.789	0.611	−0.643	1.839	0.726
RET×WARN	−	−0.531	0.297	0.037	−0.513	0.295	0.041
AGE_63		−0.617	0.256	0.016	−0.616	0.256	0.016
LOSS	+	0.271	0.100	0.004	0.271	0.100	0.004
FE_ADJ	−	−3.967	1.566	0.006	−3.969	1.565	0.006
RETVAR	+	2.684	2.441	0.136	2.709	2.466	0.136
TENURE		−0.015	0.005	0.003	−0.015	0.005	0.003
AGE_63×WARN		0.089	0.486	0.855	0.086	0.487	0.861
LOSS×WARN		−0.237	0.242	0.329	−0.227	0.243	0.350
FE_ADJ×WARN		2.031	3.331	0.542	2.103	3.353	0.531
RETVAR×WARN		−3.083	5.639	0.585	−3.424	5.599	0.541
TENURE×WARN		−0.021	0.013	0.101	−0.021	0.013	0.100
IMR×WARN					−0.136	0.217	0.529
IMR× (1-WARN)					0.023	0.291	0.936
Year dummy			Yes			Yes	
Pseudo R^2			0.0704			0.0742	
Number of obs.			7,730			7,730	

Note:
This table reports the results of regression analysis of the effect of warnings on CEO forced turnovers. All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on two-tailed tests since no directional predictions are made for warning vs. non-warning CEOs.

(b) Test Results

We present the results of the probit regression of CEO turnover in Table 9 and discuss the models with controls for self-selection. First, the coefficient on stock return is negative, suggesting that the probability of turnover is reduced as stock return increases. Second, we find a direct relationship between WARN and TURN. The coefficient on WARN is positive and marginally significant ($\beta_3 = 0.606$ with $p = 0.094$). This provides weak evidence that the issuance of warnings increases turnover rate, posing a potential cost for CEOs. Third, we find that the coefficient on RET×WARN is negative and significant ($\beta_5 = -0.513$ with $p = 0.041$), suggesting that stock return sensitivity is higher for warning CEOs ($-0.840 = -0.327 - 0.513$) than for non-warning CEOs (-0.327). Warning CEOs end up in a more risky position. If a warning CEO does well (RET > 0) in the year in which a warning is issued, the probability of being fired in the following year is significantly reduced relative to that for non-warning CEOs. This result suggests that a board of directors is willing to give a CEO a second chance as a reward for his foresight and for being forthcoming. However, if stock performance is poor (RET<0), then the probability of turnover is increased relative to non-warning CEOs. This increased sensitivity imposes an additional employment risk on warning CEOs – a risk only CEOs with higher competence and ability can afford to take. That is

© 2016 John Wiley & Sons Ltd

probably why the percentage of CEOs that warn (facing negative surprises) is relatively low. In our sample, there are 411 warning firms (40% of the warning sample) that experience positive stock returns in the year of issuance. This means that less than half of the warning CEOs could benefit from this increased sensitivity by generating positive stock returns in the current year, while the majority of CEOs would suffer from the act of issuing a warning.

To facilitate the interpretation of the coefficients, we also compute the marginal probability effect. The result shows that *on average*, the likelihood of being replaced will be *increased* by 5.1 percentage points if a warning is issued in the prior year. Considering that forced turnover among the entire sample is 3.04%, this reduction is economically significant. As for control variables, the coefficient on AGE_63 is significantly negative. In addition, incurring an earnings loss, having a larger negative earnings surprise in the previous year, as well as shorter tenure in the previous year also lead to a higher probability of being replaced.

The result (untabulated) for CEO turnover with quarter indicators shows that the timing of warning issuance does not matter. CEO turnover is not associated with warnings in any particular quarter (controlling for self-selection), while the coefficients on RET×Qi, $i = 1,2,3,4$, are all negative except for Q_4, which is positive but insignificant. Given that some Q4 warnings are issued in conjunction with annual earnings, they might be treated by compensation committees differently from warnings in other quarters, which could account for the difference. Altogether, the analysis using quarter identification does not find any evidence that the impact on CEO compensation and turnover differs across quarters.

Finally, as a falsification test, we run the same model with the turnover variable that includes only routine turnovers. Untabulated results show that neither the coefficient on WARN nor that on RET×WARN is significant ($\beta_5 = 0.301$ with $p = 0.339$ and $\beta_5 = 0.191$ with $p = 0.381$, respectively), indicating that routine turnover is not associated with warnings.

5. ROBUSTNESS CHECKS AND FURTHER ANALYSIS

(i) An Alternative Self-selection Model used in Fang (2005)

Although the model by Tucker (2007) controls for self-selection, it restricts the bonus equation to carrying the same coefficient for warning CEOs and non-warning CEOs. *Ex ante*, there is no reason to believe that the two types of CEOs would have the same compensation structure. Thus, relaxing the equality of the coefficients makes this model more general, as demonstrated by Fang (2005) through the use of separate second-stage models. The model specification is presented in Appendix A, Part 2, and the empirical results are shown in Table 10. Panel A of Table 10 reports the results of the second-stage regressions for warning and non-warning firms, respectively. The results do show some pronounced differences between the two types of CEOs. Stock returns (RET), but not accounting-based returns (ΔROA), significantly affect bonus change for warning CEOs, while both stock returns and accounting-based returns (ΔROA) significantly affect bonus change for non-warning CEOs. This difference is consistent with H2 that bonus sensitivity to stock returns is higher for warning CEOs than for non-warning CEOs.

© 2016 John Wiley & Sons Ltd

Table 10

Actual vs. Hypothetical Changes in Bonus: Warning Effect

$$\Delta \ln(\text{BONUS}_{it}) = \beta_0 + \beta_1 \Delta\text{ROA}_{it} + \beta_2 \text{RET}_{it} + \beta_3 \text{MISSED}_{it} + \beta_4 \text{SURPRISE}_{it} + \beta_5 \Delta\text{SALE}_{it} + \beta_6 \text{LEV}_{it} + \beta_7 \text{MB}_{it} + \beta_8 \text{TENURE}_{it} + \beta_9 \text{CHAIR}_{it} + \beta_{10} \text{IMR}_{it} + \varepsilon_{it}$$

Panel A: Second-stage Estimation Results For Warning And Non-warning CEOs

	WARN = 1			*WARN = 0*		
Independent Variables	*Coeff.*	*Robust Std. Err*	*P-value*	*Coeff.*	*Robust Std. Err*	*P-value*
Intercept	−1.105	0.833	0.185	−0.034	0.179	0.850
ΔROA	1.051	1.511	0.487	1.828	0.439	0.000
RET	1.632	0.304	0.000	0.759	0.076	0.000
MISSED	−1.082	0.236	0.000	−0.543	0.071	0.000
SURPRISE	−1.272	4.394	0.772	0.586	1.141	0.607
ΔSALE	0.667	0.553	0.228	0.576	0.151	0.000
LEV	−0.259	0.646	0.688	0.135	0.160	0.398
MB	−0.026	0.035	0.457	−0.031	0.009	0.001
TENURE	0.253	0.109	0.020	−0.058	0.032	0.070
CEO_CHAIR	−0.625	0.350	0.075	0.328	0.124	0.008
IMR	0.179	0.328	0.586	−0.262	0.240	0.275
Year dummy		Yes			Yes	
Industry dummy		Yes			Yes	
Adjusted R^2		0.1194			0.1506	
Number of obs.		1,320			8,969	

Panel B: Comparison for Firms That Issue Warnings (N = 1,320)

ΔLn(Bonus)	*Actual*		*Hypothetical*
	−1.350		−1.037
		T-statistics = −3.729	

Panel C: Comparison for Firms That Do Not Issue Warnings (N = 8,969)

ΔLn(Bonus)	*Actual*		*Hypothetical*
	−0.315		−0.914
		T-statistics = −20.330	

Note:
This table reports the results of the second-stage regressions for warning and non-warning CEOs separately (Panel A) and compares the actual change in bonus with the hypothetical change in bonus for warning CEOs (Panel B) and non-warning CEOs (Panel C). Hypothetical values are computed based on the formula derived in Appendix A, Part 2. All variables are as defined in Appendix C. Standard errors are adjusted for heteroscedasticity and clustered by firm. P-values are based on two-tailed tests since no directional predictions are made for warning vs. non-warning CEOs.

Based on the separate regression results for warning and non-warning CEOs, Panel B demonstrates the effect for warning CEOs by comparing the actual change in bonus ($\Delta\ln(\text{BONUS})$) with the hypothetical change in bonus had the firm chosen not to warn. The mean of the actual change is −1.350, significantly larger in the absolute magnitude than the hypothetical change of −1.037, suggesting that if a CEO had not issued a warning, the bonus reduction would have been smaller ($t = -3.73$). As expected, Panel C shows that the actual change in bonus is significantly higher than the hypothetical change, implying that the bonus of a non-warning CEO would have

© 2016 John Wiley & Sons Ltd

been reduced had the CEO issued a warning ($t = -20.33$). To summarize, the results are in line with our findings that the issuance of warnings has a negative effect on bonus change.

(ii) Controlling for the Earnings Benchmarks used in Matsunaga and Park (2001)

Matsunaga and Park (2001) find evidence that a CEO's bonus is negatively affected when the firm reports quarterly earnings below analysts' consensus forecasts, or below the earnings for the same quarter of the prior year, for at least two quarters during the year. If warning firms are, on average, more likely to miss analyst forecasts, then the negative effect of warnings on a CEO's bonus could be driven by the fact that warning firms miss the benchmarks documented in Matsunaga and Park (2001). To control for the correlated earnings benchmarks, we test H1 and H2 including the 12 earnings-benchmark measures.[22]

Untabulated results show that the coefficients on the six earnings-based benchmark measures are all significantly negative. This is consistent with the findings in Matsunaga and Park (2001). Second, the coefficient on WARN is -1.41 ($p = 0.002$), and the coefficient on RET×WARN is 0.484 ($p = 0.038$), consistent with our previous conclusions. An implication is that if a CEO issues a warning but still misses the consensus analysts' forecast for at least two quarters in a fiscal year, then the compensation committee will impose a double penalty on the CEO's bonus.

(iii) Effect of Tip-offs on CEO Compensation

While we focus on negative management guidance in our paper, it is also interesting to look at the counterpart of warnings, which we call tip-offs, to complete the study. We define a tip-off as positive earnings guidance (i.e., guidance that exceeds existing market expectations). We find no evidence (untabulated) that tip-offs affect CEO bonus and option grants. This finding supports the argument that voluntary disclosures of good news, such as tip-offs, are less credible than bad news, such as warnings (Sansing, 1992; Jennings, 1987; Hutton et al., 2003; Rogers and Stocken, 2005; Kim and Shi, 2011, and Ng et al., 2013).

6. CONCLUSION REMARKS

This study fills a void in the literature by empirically testing whether warnings affect a CEO's annual bonus, stock option grants and forced turnover. Prior literature demonstrates that firms benefit from issuing warnings when they face negative earnings surprises. Given that top management decides whether or not to issue warnings, it is important to understand the welfare consequences to those who make such decisions. We focus on CEO compensation and turnover to examine these consequences. We find that while the total compensation of CEOs is largely unaffected, warnings result in a restructuring of CEO compensation. In particular, the percentage of compensation

22 The earnings benchmarks are: whether earnings fall below the consensus analyst forecast for quarter Q*i*, *i*=1,2,3,4, during the fiscal year; whether earnings are below earnings for the same quarter of the previous year; whether earnings are below zero for quarter Q*i* during the fiscal year.

© 2016 John Wiley & Sons Ltd

from option grants (bonus) increases (decreases) significantly for warning CEOs relative to non-warning CEOs, suggesting that compensation committees adjust the compensation structure toward a more incentive-based, higher-powered, and future-oriented compensation in the year warnings are issued.

We also examine if CEO job security is affected by the issuance of warnings. The evidence related to CEO turnover is two-fold. First, we find weak evidence that the issuance of a warning directly increases the likelihood of a CEO being replaced. Second, we document that when stock returns are positive, issuing warnings could reduce CEOs' forced turnover rate, which explains how some CEOs benefit from warnings. However, when stock returns are negative, a CEO is more likely to be replaced, because boards of directors are more concerned about the negative future prospects of the firm signaled by the warnings. The fact that the number of CEOs who issue warnings is relatively small (13% in our sample) is consistent with the notion that direct benefits to CEOs may be limited to a small subset of CEOs who can afford to take more risk, e.g., CEOs with higher ability. Although we shed some light on this issue, more research is needed to help us fully understand, from the CEOs' perspective, the motivations involved in the issuance of warnings.

While this study focuses on CEOs in the US, management earnings forecasts are issued in other countries as well. There appears to be substantial variation in frequency across countries (Brown and Higgins, 2005; and Kargeorgiou and Serafeim, 2014). Brown and Higgins (2005) find that the frequency of warnings is higher in countries with stronger investor protection. The motives of managers in issuing forecasts are ascribed to expectation management ("to avoid negative surprises") rather to the desire to make timely disclosures. When choosing between manipulating earnings upwards or guiding analysts' forecast downwards to avoid negative earnings surprises, managers in weak-investor-protection environments are more likely to choose the former, while those in strong-investor-protection environments are more likely to choose the latter (Leuz et al., 2003). The investor-protection environment also affects the information content of management guidance (Ng et al., 2015). We expect that concern to mitigate litigation risk might be weaker outside the US. Recent research documents, however, that voluntary earnings guidance became more prevalent in the countries that had adopted International Financial Reporting Standards (IFRS). For example, Balakrishnan et al. (2014) document that the issuance of voluntary earnings forecasts has increased, particularly in countries where IFRS was adopted in 2005, consistent with Brown and Higgins (2005).

Voluntary disclosures made by management are expected to improve the information environment of firms. Warnings constitute, for example, a component of timely disclosures of bad news, consistent with conservative accounting. On the other hand, some researchers are critical of regular disclosures, especially of quarterly earnings forecasts. For example, Karageorgiou and Serafeim (2014) point out that such practices could involve substantial associated costs, such as increased short-termism and earnings management, analyst herding and insider trading. Chen et al. (2015) document, however, that firms that provide earnings guidance exhibit a greater number of future patents and citations than non-guiders. Clearly, more research is called for to understand the role of management guidance in the motivation and reward of CEOs.

© 2016 John Wiley & Sons Ltd

APPENDIX A: SELF-SELECTION MODEL SPECIFICATIONS

Part 1: Self-selection model following Tucker (2007)

Following Tucker (2007), self-selection as to warn or not to warn is modeled in the following system:

$$\Delta\ln(\text{BONUS})_{1i} = \alpha_1 + X_i\beta + \upsilon_{1i} \text{ (data observed only when WARN}_i^* > 0) \quad \text{(A1)}$$

$$\Delta\ln(\text{BONUS})_{0i} = \alpha_0 + X_i\beta + \upsilon_{0i} \text{ (data observed only when WARN}_i^* \leq 0) \quad \text{(A2)}$$

$$\text{WARN}_i^* = Z_i\gamma + \varepsilon_i. \quad \text{(A3)}$$

Because the error terms in both (A1) and (A2) may be correlated with the error term in (A1), the expected values of these terms are non-zero, violating an OLS assumption. To solve this problem, it is necessary to write out the conditional expectations of the error terms and include them in (A1) and (A2) as follows:

$$\begin{aligned} E[\Delta\ln(\text{BONUS})_{1i}|\text{WARN}_i = 1] &= \alpha_1 + X_i\beta + E(\upsilon_{1i}|\varepsilon_i > -Z_i\gamma) \\ &= \alpha_1 + X_i\beta + \sigma_{\varepsilon\upsilon_1}\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)} \end{aligned} \quad \text{(A4)}$$

$$\begin{aligned} E[\Delta\ln(\text{BONUS})_{0i}|\text{WARN}_i = 0] &= \alpha_0 + X_i\beta + E(\upsilon_{0i}|\varepsilon_i \leq -Z_i\gamma) \\ &= \alpha_0 + X_i\beta + \sigma_{\varepsilon\upsilon_0}\frac{-\varphi(Z_i\gamma)}{1-\Phi(Z_i\gamma)}. \end{aligned} \quad \text{(A5)}$$

Lastly, combining (A4) and (A5) results in a single equation:

$$\Delta\ln(\text{BONUS})_i = \alpha_0 + \theta\text{WARN}_i + X_i\beta + \sigma_{\varepsilon\upsilon_1}\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)} + \sigma_{\varepsilon\upsilon_0}\frac{-\varphi(Z_i\gamma)}{1-\Phi(Z_i\gamma)} + \omega_i. \quad \text{(A6)}$$

Where $\theta = \alpha_1 - \alpha_0$, and $\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)}$ is denoted as IMR *WARN; $\frac{-\varphi(Z_i\gamma)}{1-\Phi(Z_i\gamma)}$ is denoted as IMR *(1–WARN).

Part 2: Self-selection model following Fang (2005)

Consistent with Fang (2005), we compute the warning effect using the following formula:

$$\Delta\ln(\text{BONUS})_{1i} - E[\Delta\ln(\text{BONUS})_{0i}\,|\,\text{WARN}_i^* > 0], \quad \text{(a)}$$

where the second term reflects the hypothetical change in bonus for a warning firm had the firm not issued a warning, and the first term is the actual change in bonus for the warning firm. The hypothetical value is computed as follows:

$$E[\Delta\ln(\text{BONUS})_{0i}\,|\,\text{WARN}_i^* > 0] = \alpha_0 + X_i\beta_0 + \sigma_{0\varepsilon}\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)}. \quad \text{(b)}$$

© 2016 John Wiley & Sons Ltd

Step 1, to implement equation (b), we run equations (c) and (d) separately to obtain β_0 and β_1.

$$E[\Delta \ln(\text{BONUS})_{1i} | \text{WARN}_i = 1] = \alpha_1 + X_i\beta + E(\upsilon_{1i} | \varepsilon_i > -Z_i\gamma) = \alpha_1 + X_i\beta_1 + \sigma_{\varepsilon\upsilon_1}\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)} \quad \text{(c)}$$

$$E[\Delta \ln(\text{BONUS})_{0i} | \text{WARN}_i = 0] = \alpha_0 + X_i\beta + E(\upsilon_{0i} | \varepsilon_i \leq -Z_i\gamma) = \alpha_0 + X_i\beta_0 + \sigma_{\varepsilon\upsilon_0}\frac{-\varphi(Z_i\gamma)}{1 - \Phi(Z_i\gamma)}. \quad \text{(d)}$$

Step 2, to compute the hypothetical bonus value for warning firms, we multiply the variable values, including the Inverse Mills Ratio ($\frac{\varphi(Z_i\gamma)}{\Phi(Z_i\gamma)}$) of warning firms, by the coefficients from non-warning firms. Third, we compute the difference between the actual change in bonus for warning firms and the computed hypothetical value of the change in the bonus, obtained from Step 2. If the difference calculated in (a) is negative (i.e., the hypothetical change is greater than an actual change in bonus), it suggests that a warning firm's CEO would not have been penalized by a reduced bonus award had the firm chosen not to issue a warning, supporting the hypothesis.

APPENDIX B: PROBIT MODEL OF LITIGATION RISK

RISK in Table 5 (Model 2) is defined as the predicted value of litigation risk. The litigation risk model is based on the probit model used in Johnson et al. (2001), Rogers and Stocken (2005) and Tucker (2007). The litigation data are from 1996 to 2011 and are obtained from the Stanford Securities Class Action Clearinghouse website. RISK is set to 1 if the firm is a defendant in a class-action lawsuit filed in that year, and 0 otherwise. All explanatory variables are measured in the 12-month period prior to the event year. The model is as follows:

$$\begin{aligned}\Pr(\text{RISK}_{it+1} = 1) = \Phi(&\alpha_0 + \alpha_1\text{LN\_SIZE}_{it} + \alpha_2\text{TURNOVER}_{it} + \alpha_3\text{BETA}_{it} + \alpha_4\text{CUMRET}_{it} \\ &+ \alpha_5\text{STDRET}_{it} + \alpha_6\text{MINRET}_{it} + \alpha_7\text{BIO}_{it} + \alpha_8\text{COMPUTER}_{it} \\ &+ \alpha_9\text{ELECTRONICS} + \alpha_{10}\text{RETAIL}_{it} + \alpha_{11}\text{SOFTWARE}_{it} + \varepsilon_{it+1})\end{aligned}$$

The above model is estimated using all Compustat firm-years with sufficient information on CRSP during the period 1995 to 2010.[23] Untabulated results show that all of the variables are significant except for RETAIL. The adjusted R-squared value is 0.129, which is comparable to that in the previous literature.

The variables are defined as follows: LN_SIZE is the natural logarithm of the average daily market value of equity over the 12 months before the event year; TURNOVER is the average daily trading volume deflated by the number of shares outstanding over the 12 months before the event year; BETA is the slope coefficient from regressing

23 For example, if a firm is sued on 2/1/1997, then RISK=1 in year 1997, and all independent variables are measured during the calendar year of 1996. The variable is then included in the first-stage estimation for fiscal year 1997.

© 2016 John Wiley & Sons Ltd

daily stock returns on the market returns downloaded from CRSP over the 12 months before the event year; CUMRET is the sum of daily raw returns over the 12 months before the event year; STDRET is the standard deviation of daily raw returns over the 12 months before the event year; MINRET is the minimum daily raw returns over the 12 months before the event year; BIO (COMPUTER, ELECTRONICS, RETAIL, SOFTWARE) is 1 if the firm is operated in bio-technology (computer hardware, electronics, retail, computer software) industry, and 0 otherwise.

APPENDIX C: VARIABLE DEFINITIONS

Variable		*Definition*	*Data source*
WARN	=	1 if a firm issues negative earnings guidance during a confession window (i.e., the period between the beginning of the third fiscal month and one day before the quarterly earnings announcement date) in any quarter of the fiscal year, 0 otherwise;	First call
Δln(BONUS)	=	the difference between the natural logarithm of US$ 1 plus bonus in year *t* and *t*–1;	Execucomp
Δln(OPTION$)	=	the difference between the natural logarithm of 1 plus the Black-Scholes value of annual option-based compensation in year *t* and *t*–1;	Execucomp
Δln(OPTION#)	=	the difference between the natural logarithm of 1 plus the number of the annual option grants in year *t* and *t*–1;	Execucomp
ΔOPTION%	=	the difference between the Black-Scholes value of annual option-based compensation divided by total annual compensation in year *t* and *t*–1;	Execucomp
TOTAL	=	total compensation;	Execucomp
TURN	=	1 if there is a forced turnover, 0 otherwise;	Execucomp and hand-collected
RISK	=	the predicted value of the likelihood of being sued (see Appendix B);	
LN_MVE	=	the natural logarithm of the market value of equity measured at the beginning of the fiscal year;	Compustat
SURPRISE	=	the lowest quarterly surprise, where surprise is defined as the difference between actual earnings and the last consensus analyst forecast issued prior to the confession window;	IBES
UPDATE_GUIDE	=	1 if a firm has issued earnings guidance before the confession window of any fiscal quarter, 0 otherwise;	First call
PAST_GUIDE	=	the number of earnings guidance issued by a firm in the previous fiscal year;	First call
NUMEST	=	the average number of analysts whose earnings forecasts are included in the most recent consensus forecast compiled before the confession window;	IBES

(*Continued*)

© 2016 John Wiley & Sons Ltd

IOR	=	the number of institutional share holdings divided by the total number of shares outstanding measured at the beginning of the fiscal year;	13F Institutions
MISSED	=	1 if the current year's EPS excluding extraordinary items is lower than the previous year's EPS excluding extraordinary items, 0 otherwise;	Compustat
MB	=	the market value of equity divided by the book value of common equity measured at the beginning of the fiscal year;	Compustat
ROA	=	earnings before interest, taxes, depreciation and amortization divided by the beginning-year book value of total assets;	Compustat
ROA_STD	=	the standard deviation of ROA during the past four fiscal years;	Compustat
FD	=	1 if the fiscal year-end date is after 01/10/2000: the date the Regulation Fair Disclosure takes effect, 0 otherwise;	
COMP_STRUCTURE	=	the ratio of option compensation to cash compensation;	Excucomp
TENURE	=	the natural logarithm of 1 plus CEO tenure, which is the difference between the year the CEO assumed the office and the current fiscal year;	Excucomp
BDSIZE	=	the number of directors on the board;	ISS (formerly RiskMetrics)
BDINDEP	=	the percentage of independent directors on the board;	ISS
GOVMISSING	=	1 if a firm is not covered by the ISS database, 0 otherwise;	ISS
RET	=	cumulative monthly raw returns during the fiscal year;	CRSP
ΔSALE	=	change in the natural logarithm of sales from the prior year;	Compustat
LEV	=	debt divided by total assets measured at the beginning of the fiscal year;	Compustat
MB	=	the market value of equity divided by the book value of common equity measured at the beginning of the fiscal year;	Compustat
CEO_CHAIR	=	1 if a firm's CEO is also the chairman of the board, 0 otherwise.	Execucomp
SHARES_OWN	=	CEO's ownership in shares (options excluded) divided by the number of outstanding shares;	Execucomp / CSRP
EXER_OPT	=	CEO's exercisable options in shares divided by the number of outstanding shares;	Execucomp / CSRP
SIZE	=	the natural logarithm of sales;	Compustat
R&D	=	research and development expenses;	Compustat
CASH_CSTR	=	common and preferred dividends minus net cash flow from investment activities minus net cash flow from operating activities, divided by total assets;	Compustat
EARN_CSTR	=	1 if there is an operating earnings loss, 0 otherwise;	Compustat

(*Continued*)

© 2016 John Wiley & Sons Ltd

CASH	=	the sum of annual salary and bonus divided by sales;	Compustat
RISK_ID	=	the standard deviation of the residual from the market model using weekly returns over the past 12 months;	CSRP
AGE_63	=	1 if the CEO is at least 63 years of age during the event year, 0 otherwise;	Execucomp
LOSS	=	1 if the firm experiences an earnings loss in the year prior to the event, 0 otherwise;	Compustat
FE_ADJ	=	the difference between the realized EPS for the previous year and the forecasted EPS at the beginning of the previous year, scaled by the stock price at the beginning of the year;	IBES
RETVAR	=	the variance of stock returns during the 24 months prior to the event year;	CRSP
IMR	=	Inverse Mills Ratio; see model specification in Appendix A, part 1.	

REFERENCES

Aboody, D. and R. Kasznik (2000), 'CEO Stock Option Awards and the Timing of Voluntary Corporate Disclosures', *Journal of Accounting and Economics*, Vol. 29, No. 1, pp. 73–100.

Ajinkya, B., S. Bhojraj and P. Sengupta (2005), 'The Association between Outside Directors, Institutional Investors and the Properties of Management Earnings Forecasts', *Journal of Accounting Research*, Vol. 43, No. 3, pp. 343–76.

Albuquerque, A. (2009), 'Peer Firms in Relative Performance Evaluation', *Journal of Accounting and Economics*, Vol. 48, No. 1, pp. 69–89.

Anilowski, C., M. Feng and D. J. Skinner (2007), 'Does Earnings Guidance Affect Market Returns? The Nature and Information Content of Aggregate Earnings Guidance', *Journal of Accounting and Economics*, Vol. 44, Nos. 1&2, pp. 36–63.

Antle, R. and A. Smith (1986), 'An Empirical Investigation of the Relative Performance Evaluation of Corporate Executives', *Journal of Accounting Research*, Vol. 24, No. 1, pp. 1–39.

Atiase, R.K., S. Supattarakul and S. Tse (2006), 'Market Reaction to Earnings Surprise Warnings: the Incremental Role of Shareholder Litigation Risk on the Warning Effect', *Journal of Accounting, Auditing and Finance*, Vol. 21, No. 2, pp. 191–222.

Baber, W., S. Janakiraman and S. Kang (1996), 'Accounting Earnings and Executive Compensation: the Role of Earnings Persistence', *Journal of Accounting and Economics*, Vol. 25, No. 2, pp. 169–93.

Baik, B.O.K., D.B. Farber and S.S. Lee (2011), 'CEO Ability and Management Earnings Forecasts', *Contemporary Accounting Research*, Vol. 28, No. 5, pp. 1645–68.

Balakrishnan, K., X. Li and H. Yang (2014), 'Mandatory Financial Reporting and Voluntary Disclosure: Evidence from Mandatory IFRS Adoption', Working Paper (Wharton School).

Bamber, L., J. Jiang and I.Y. Wang (2010), 'What's My Style? The Influence of Top Managers on Voluntary Corporate Financial Disclosure', *The Accounting Review*, Vol. 85, No. 4, pp. 1131–62.

Brown, L. D. and H.N. Higgins (2005), 'Managers' Forecast Guidance of Analysts: International Evidence', *Journal of Accounting and Public Policy*, Vol. 24, No. 4, pp. 280–99.

Bryan, S., L. Hwang and S. Lilien (2000), 'CEO Stock-Based Compensation: An Empirical Analysis of Incentive-Intensity, Relative Mix, and Economic Determinants', *Journal of Business*, Vol. 73, No. 4, pp. 661–93.

Bushman, R., Z. Dai and X. Wang (2010), 'Risk and CEO Turnover', *Journal of Financial Economics*, Vol. 96, No. 3, pp. 381–98.

Cameron, A.C. and P. K. Trivedi (2005), *Microeconometrics: Methods and Applications* (New York: Cambridge University Press).

© 2016 John Wiley & Sons Ltd

Carter, M.E., L.J. Lynch and I. Tuna (2007), 'The Role of Accounting in the Design of CEO Equity Compensation', *The Accounting Review*, Vol. 82, No. 2, pp. 327–57.
Chen, S., D. Mastumoto and S. Rajgopal (2011), 'Is Silence Golden? An Empirical Analysis of Firms that Stop Giving Quarterly Earnings Guidance', *Journal of Accounting and Economics*, Vol. 51, No. 1, pp. 134–50.
Chen, S., K. Huang and B. Y. Lao (2015), 'Is Earnings Guidance Associated with Less Firm Innovation?', Working Paper, Universrity of Texas at Austin.
Cheng, Q. and D. Farber (2008), 'Earnings Restatement, Changes in CEO Compensation, and Firm Performance', *The Accounting Review*, Vol. 83, No. 5, pp. 1217–50.
Chuk, E., D. Matsumoto and G. Miller (2013), 'Assessing Methods of Identifying Management Forecasts: CIG Vs. Researcher Collected', *Journal of Accounting and Economics*, Vol. 55, No. 1, pp. 23–42.
Choi, J. H., L. Myers, Y. Zang and D. Ziebart (2011), 'Do Management EPS Forecasts Allow Returns to Reflect Future Earnings? Implications for the Continuation of Management's Quarterly Earnings Guidance', *Review of Accounting Studies*, Vol. 16, No. 1, pp. 143–82.
Coller, M. and T. Yohn (1997), 'Management Forecasts and Information Asymmetry: An Examination of Bid-Ask Spreads', *Journal of Accounting Research*, Vol. 35, No. 2, pp. 181–91.
Core, J., R. Holthausen and D. Larcker (1999), 'Corporate Governance, Chief Executive Officer Compensation, and Firm Performance', *Journal of Financial Economics*, Vol. 51, No. 3, pp. 371–406.
——— and D. Larcker (2002), 'Performance Consequences of Mandatory Increases in Executive Stock Ownership', *Journal of Financial Economics*, Vol. 64, No. 3, pp. 317–40.
——— and W. Guay (1999), 'The Use of Equity Grants to Manage Optimal Incentive Levels', *Journal of Accounting and Economics*, Vol. 28, No. 2, pp. 151–84.
———, ——— and D. Larcker (2003a), 'Executive Equity Compensation and Incentives: A Survey', *Federal Reserve Bank of New York Economic Policy Review*, April, pp. 27–50.
———, ——— and R. Verrecchia (2003b), 'Price versus Non-Price Performance Measures in Optimal CEO Compensation Contracts', *The Accounting Review*, Vol. 78, No. 4, pp. 957–81.
Cotter, J., I. Tuna and P. Wysocki (2006), 'Expectations Management and Beatable Targets: How Do Analysts React To Explicit Earnings Guidance?' *Contemporary Accounting Research*, Vol. 23, No. 3, pp. 593–624.
Darrough, M. (1995), 'Discussion of "Disclosure of Predecision Information in a Duopoly', *Contemporary Accounting Research*, Vol. 11, No. 2, pp. 861–72.
——— and N. Stoughton (1990), 'Financial Disclosure Policy in an Entry Game', *Journal of Accounting and Economics*, Vol. 12, No. 1, pp. 219–43.
Das, S., K. Kim and S. Patro (2012), 'On the Anomalous Stock Price Response to Management Earnings Forecasts', *Journal of Business Finance & Accounting*, Vol. 39, Nos. 7&8, pp. 905–35.
DeFond, M. and C. Park (1999), 'The Effect of Competition on CEO Turnover', *Journal of Accounting and Economics*, Vol. 27, No. 1, pp. 35–56.
De Franco, G., O. K. Hope and S. Larocque (2013), 'The Effect of Disclosure on the Pay-Performance Relation', *Journal of Accounting and Public Policy*, Vol. 32, No. 5, pp. 319–41.
Donelson, D., J. M. McInnis, R. Mergenthaler and Y. Yu (2012), 'The Timeliness of Bad Earnings News and Litigation Risk', *The Accounting Review*, Vol. 87, No. 6, pp. 1967–91.
Dutta, S. and B. Trueman (2002), 'The Interpretation of Information and Corporate Disclosure Strategies', *Review of Accounting Studies*, Vol. 7, No. 1, pp. 75–96.
Engel, E., R. Hayes and X. Wang (2003), 'CEO Turnover and Properties of Accounting Information', *Journal of Accounting and Economics*, Vol. 36, No. 1, pp. 197–226.
Fang, L. H. (2005), 'Investment Bank Reputation and the Price and Quality of Underwriting Services', *The Journal of Finance*, Vol. 60, No. 6, pp. 2729–61.
Farrell, K. and D. Whidbee (2003), 'The Impact of Firm Performance Expectations on CEO Turnover and Replacement Decisions', *Journal of Accounting and Economics*, Vol. 36, No. 1, pp. 165–96.
Francis, J., A. Huang, S. Rajgopal and A. Zang (2008), 'CEO Reputation and Earnings Quality', *Contemporary Accounting Research*, Vol. 25, No. 1, pp. 149–56.
Guay, W. (1999), 'The Sensitivity of CEO Wealth to Equity Risk: An Analysis of the Magnitude and Determinants', *Journal of Financial Economics*, Vol. 53, No. 1, pp. 43–71.

© 2016 John Wiley & Sons Ltd

Heckman, J.J. (1979), 'Sample Selection Bias as a Specification Error', *Econometrica*, Vol. 47, No. 1, pp. 153–61.
Heflin, F., K.R. Subramanyam and Y. Zhang (2003), 'Regulation FD and the Financial Information Environment: Early Evidence', *The Accounting Review*, Vol. 78, No. 1, pp. 1–37.
Holmström, B. (1979), 'Moral Hazard and Observability', *The Bell Journal of Economics*, Vol. 10, No. 1, pp. 74–91.
Houston, J., B. Lev and J.W. Tucker (2010), 'To Guide or Not to Guide? Causes and Consequences of Stopping Quarterly Earnings Guidance', *Contemporary Accounting Research*, Vol. 27, No. 1, pp. 143–85.
Hutton, A. P., G.S. Miller and D.J. Skinner (2003), 'The Role of Supplementary Statements with Management Earnings Forecasts', *Journal of Accounting Research*, Vol. 41, No. 5, pp. 867–90.
Jennings, R. (1987), 'Unsystematic Security Price Movements, Management Earnings Forecasts, and Revisions in Consensus Analysts Earnings Forecasts', *Journal of Accounting Research*, Vol. 25, No. 1, pp. 90–110.
Jensen, M. and W. Meckling (1976), 'Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure', *Journal of Financial Economics*, Vol. 3, No. 4, pp. 305–60.
Johnson, M., R. Kasznik and K. Nelson (2001), 'The Impact of Securities Litigation Reform on the Disclosure of Forward-Looking Information by High Technology Firms', *Journal of Accounting Research*, Vol. 39, No. 2, pp. 297–327.
Karagiorgiou, G. and G. Serafeim (2014), '*Earnings Guidance – Part of the Future or the Past?*' (London: Generation Foundation).
Kasznik, R. and B. Lev (1995), 'To Warn or Not to Warn: Management Disclosures in the Face of an Earnings Surprise', *The Accounting Review*, Vol. 70, No. 1, pp. 113–34.
Keskek, S., L. Rees and W. Thomas (2013), 'Earnings Announcements, Differences of Opinion and Management Guidance', *Journal of Business Finance & Accounting*, Vol. 40, Nos. 7&8, pp. 769–95.
Kim, J. W. and Y. Shi (2011), 'Voluntary Disclosure and the Cost of Equity Capital: Evidence from Management Earnings Forecasts', *Journal of Accounting and Public Policy*, Vol. 30, No. 4, pp. 348–66.
Lambert, R. and D. Larcker (1987), 'An Analysis of the Use of Accounting and Market Measures of Performance in Executive Compensation Contracts', *Journal of Accounting Research*, Vol. 25, Supplement, pp. 85–125.
Larcker, D. and T. Rusticus (2010), 'On the Use of Instrumental Variables in Accounting Research', *Journal of Accounting and Economics*, Vol. 49, No. 3, pp. 186–205.
Lang, M. and R. Lundholm (1996), 'Corporate Disclosure Policy and Analyst Behavior', *The Accounting Review*, Vol. 71, No. 4, pp. 467–92.
Lee, S., S. R. Matsunaga and C. W. Park (2012), 'Management Forecast Accuracy and CEO Turnover', *The Accounting Review*, Vol. 87, No. 6, pp. 2095–122.
Lennox, C., J. Francis and Z. Wang (2012), 'Selection Models in Accounting Research', *The Accounting Review*, Vol. 87, No. 2, pp. 589–616.
Leone, A., J. Wu and J. Zimmerman (2006), 'Asymmetric Sensitivity of CEO Cash Compensation to Stock Returns', *Journal of Accounting and Economics*, Vol. 42, No. 1, pp. 167–92.
Leuz, C., D. Nanda and P. D. Wysocki (2003), 'Earnings Management and Investor Protection: An International Comparison', *Journal of Financial Economics*, Vol. 69, No. 3, pp. 505–27.
Matsunaga, S. and C. Park (2001), 'The Effect of Missing a Quarterly Earnings Benchmark on the CEO's Annual Bonus', *The Accounting Review*, Vol. 76, No. 3, pp. 313–32.
Mercer, M. (2005), 'The Fleeting Effects of Disclosure Forthcomingness on Management's Reporting Credibility', *The Accounting Review*, Vol. 80, No. 2, pp. 723–44.
Murphy, K. (1999), 'Executive Compensation', in Ashenfelter, O. and D. Card (eds.), *Handbook of Labor Economics*, Vol. 1. (North-Holland, Amsterdam), pp. 2485–2563.
Murphy, K. and J. Zimmerman (1993), 'Financial Performance Surrounding CEO Turnover', *Journal of Accounting and Economics*, Vol. 16, No. 1, pp. 273–316.
Myers, S. (1977), 'Determinants of Corporate Borrowing', *Journal of Financial Economics*, Vol. 5, No. 2, pp. 147–75.
Nagar, V., D. Nanda and P. Wysocki (2003), 'Discretionary Disclosure and Stock-Based Incentives', *Journal of Accounting and Economics*, Vol. 34, No. 1, pp. 283–309.

© 2016 John Wiley & Sons Ltd

Ng, J., I. Tuna and R. Verdi (2013), 'Management Forecast Credibility and Underreaction to News', *Review of Accounting Studies*, Vol. 18, No. 4, pp. 956–86.
Ng, J., A. Tsang and O. Urcan (2015), 'Management Forecast Disaggregation and the Legal Environment: International Evidence', Working Paper, Chinese University of Hong Kong. Available online at: http://ssrn.com/abstract=2507050.
Puffer, S. and J. Weintrop (1991), 'Corporate Performance and CEO Turnover: the Role of Performance Expectations', *Administrative Science Quarterly*, Vol. 36, No. 1, pp. 1–19.
Rogers, J. L. and P.C. Stocken (2005), 'Credibility of Management Forecasts', *The Accounting Review*, Vol. 80, No. 4, pp. 1233–60.
Sansing, R.C. (1992), 'Accounting and the Credibility of Management Forecasts', *Contemporary Accounting Research*, Vol. 9, No. 1, pp. 33–45.
Skinner, D. (1994), 'Why Firms Voluntarily Disclose Bad News', *Journal of Accounting Research*, Vol. 32, No. 1, pp. 38–60.
——— (1997), 'Earnings Disclosures and Stock Holder Lawsuits', *Journal of Accounting and Economics*, Vol. 23, No. 3, pp. 249–82.
Sloan, R. (1993), 'Accounting Earnings and Top Executive Compensation', *Journal of Accounting and Economics*, Vol. 16, No. 1, pp. 55–100.
Smith, C. and R. Watts (1992), 'The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies', *Journal of Financial Economics*, Vol. 32, No. 3, pp. 263–92.
Tang, M., L. Yao and P. Zarowin (2015), 'Once is Not Enough: The Determinants and Consequences of Management Updates of Annual Forecasts', Working Paper (New York University).
Trueman, B. (1986), 'Why do Managers Voluntarily Release Earnings Forecasts?' *Journal of Accounting and Economics*, Vol. 8, No. 1, pp. 53–71.
——— (1997), 'Managerial Disclosures and Shareholder Litigation', *Review of Accounting Studies* 1, pp. 181–99.
Tse, S. and J. W. Tucker (2010), 'Within-Industry Timing of Earnings Warnings: Do Managers Herd? *Review of Accounting Studies*, Vol. 15, pp. 879–914.
Tucker, J. W. (2007), 'Is Openness Penalized? Stock Returns Around Earnings Warnings', *The Accounting Review*, Vol. 82, No. 4, pp. 1055–87.
Wang, I.Y. (2007), 'Private Earnings Guidance and Its Implications for Disclosure Regulation', *The Accounting Review*, Vol. 82, No. 5, pp. 1299–332.
Xu, W. (2008), 'Market Reactions to Warnings of Negative Earnings Surprises: Further Evidence', *Journal of Business Finance & Accounting*, Vol. 35, Nos. 7&8, pp. 818–36.
Yermack, D. (1995), 'Do Corporations Award CEO Stock Options Effectively?' *Journal of Financial Economics*, Vol. 39, No. 2, pp. 237–69.

© 2016 John Wiley & Sons Ltd